Volume 6, Number 3 $4.00 October 1988

TEACHING and computers

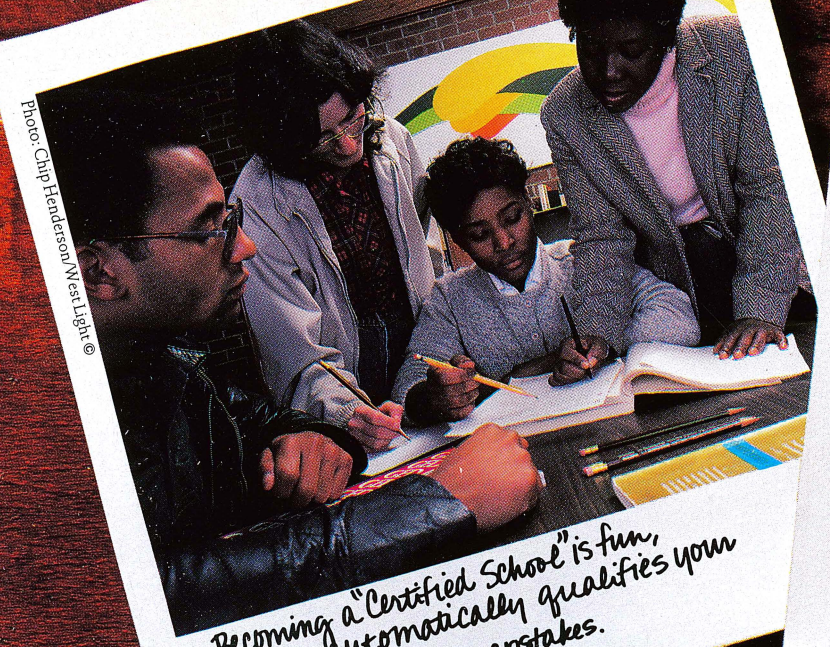
TEACHER POWER IN THE COMPUTER CLASSROOM

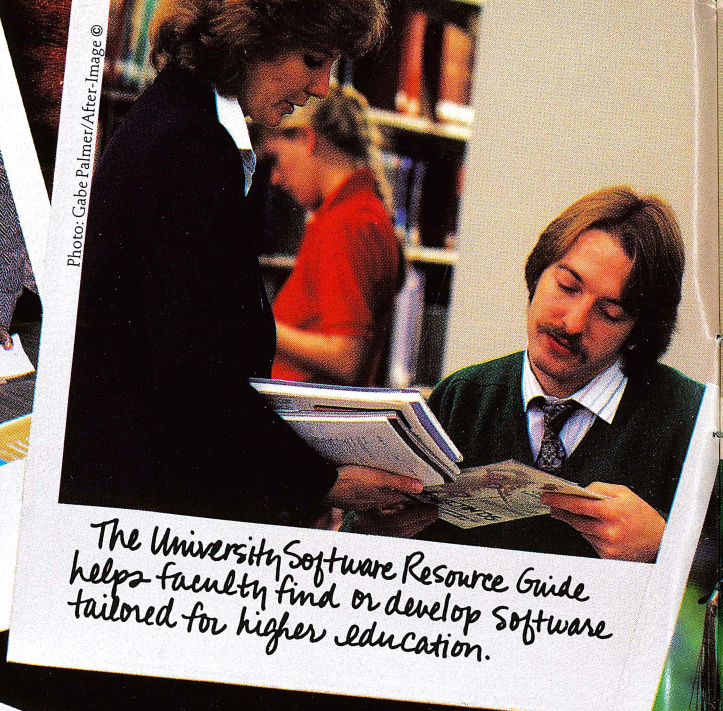
A NEW LOOK AT PROFESSIONAL DEVELOPMENT

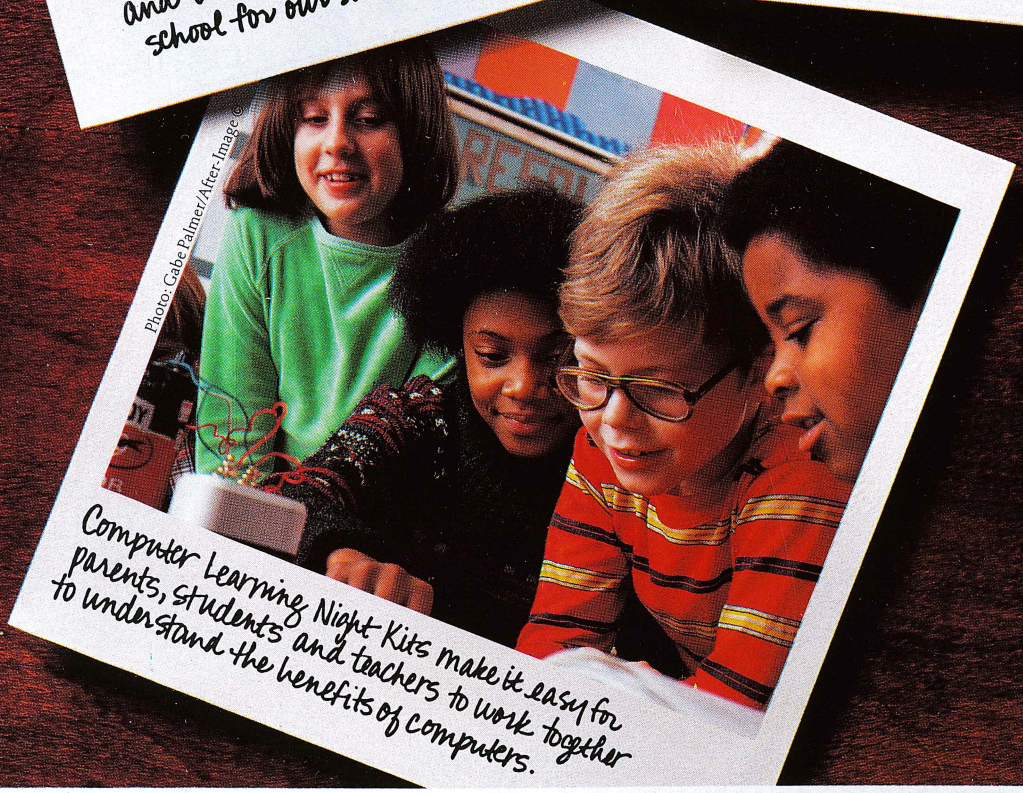
Solar System Adventure
Election '88 Super Page
Teacher's Desktop Publishing
Encyclopedia Task Cards

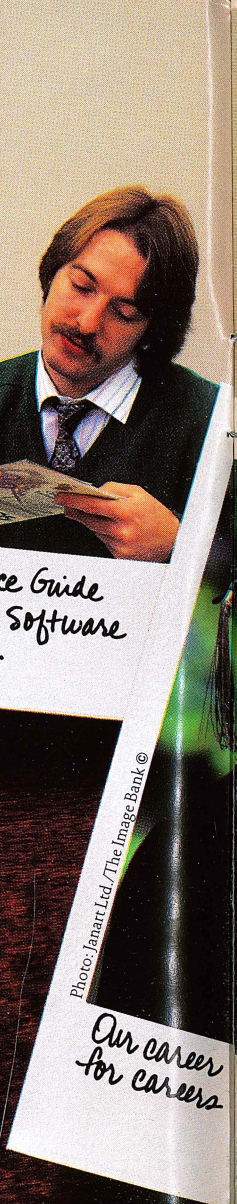
Doris Ray of the Maine Computer Consortium leads a teacher workshop.

SCHOLASTIC









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TEACHING and computers™

October 1988 Volume 6, Issue 2

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"Empowerment" is education's latest buzzword — but what does it mean for *you*? An expert in teacher professional development reveals four kinds of power every computer-using educator can cultivate.

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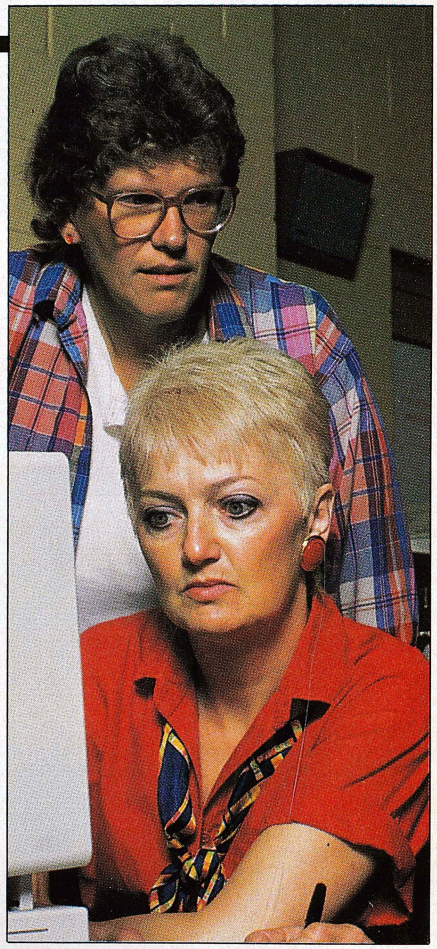

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COVER PHOTO BY RICK BARRICK

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A Pop Quiz For School Computer Buyers

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2. Based on list prices—$799 for the Apple //c and $479 for the LASER 128,® how many LASERS can you get for the price of three Apples?
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   B. 5
   C. 8

3. Which computer is readily available through computer shops, leading department stores, and educational dealers?
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   B. Apple
   C. Both

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FROM THE EDITOR

Focus on Teacher Power

After almost a decade, educational computing is out of its infancy and careening toward adolescence. Researchers are busily gathering evidence about the impact of computers on education, with divergent results. The National Assessment of Educational Progress gave American students a mediocre "Report Card" on computer competence, while a new study soon to be published by M. D. Roblyer and colleagues of Florida A&M University concludes that computers have "undeniable value" in education. One of the most interesting pieces of research, though, is that included in the U.S. Congress' Office of Technology Assistance report, which indicates the powerful effect computers have on teacher renewal and teacher creativity. It's that impact — and the inevitable positive ripple effect on learning — that cover story writer Doris Ray focuses on in "Teacher Power in the Computer Classroom."

Doris and her colleagues at the Maine Computer Consortium specialize in placing technology tools in the hands of teachers as a means to improving and enlivening their professional practice. Some of the *T&C* staff was fortunate enough to see Doris in action in Cumberland, Maine this past summer, where she conducted a workshop-cum-photo session with local computer-using teachers.

The setting was Greely High School, where computer instructor Joe Bickard was holding a week-long training session for teachers of grades K-12 in the Cumberland area, northeast of Portland. On the day Doris came to teach, the audience included special education teachers, elementary school generalists, even a high school French instructor. All were soon absorbed in working with the components of a multi-disciplinary teaching unit on immigration, using *AppleWorks* and a data base created by Harvard's Educational Technology Center, plus Tom Snyder Productions' *Decisions, Decisions* package on immigration and *Timeliner.*

Before the half-day session was over, these computer-using teachers had added substantially to their own stores of the four kinds of power Doris outlines in this issue's cover piece: knowledge power, support power, resource power, and personal power. And the *T&C* staff had reaffirmed its own commitment to aiding teacher empowerment — with every page in every issue of the magazine.

M. Revenaugh

Doris Ray (standing, left) and T&C art director Shelley LaRoche-Stansfield (standing, right) watch computer-using teachers in action in Maine.

TEACHING and computers

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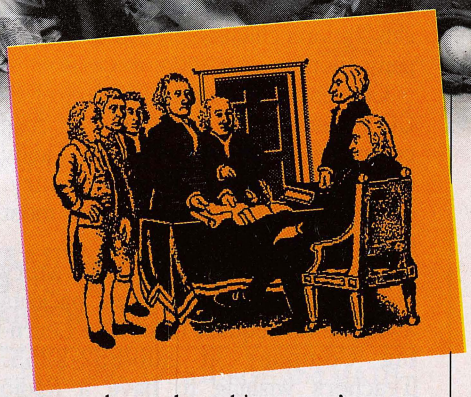

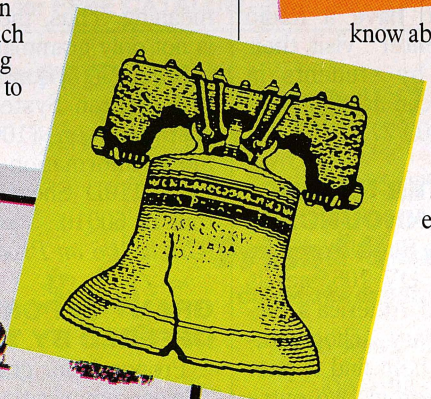

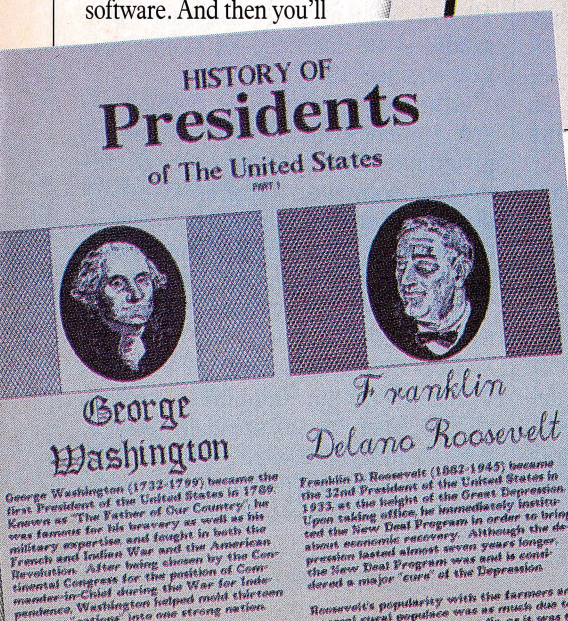

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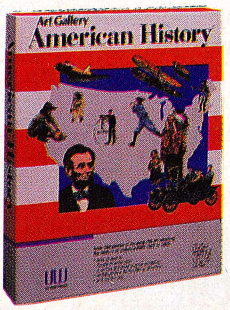

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UPDATE

NEWS FOR COMPUTER-USING TEACHERS

SILLY STORY WRITING CONTEST

Students in grades two through five are eligible to enter a story writing contest based on "silly story" lines from *Writer Rabbit*, a language arts software program developed by The Learning Company.

Entries, which must be postmarked no later than November 30, 1988, may be submitted individually or as part of a class project. The entries can be handwritten or computer-generated, and will be judged on originality and the aptness of the illustrations children create to accompany them.

Contest prizes include a trip to EPCOT Center at Disney World, free computer software, and a free Tandy computer to the winning class entry, as well as to the class with the most contest entries.

Copies of the "silly story" story lines are included in contest packets available on request from The Learning Company at 800/852-2255. Teachers wishing to have a Radio Shack "publishing center" visit their classroom for use by students in writing their stories can call 800/433-5682 or, in Texas, 800/772-8358.

SHUTTLE ORBITER-NAMING COMPETITION ANNOUNCED

NASA's new Space Shuttle orbiter, currently designated OV 105, needs a "real" name — and America's elementary and secondary school students are invited to help find it one. To participate, children in two entry divisions — K-6 and 7-12 — are invited to form teams and research a name, as well as prepare a related interdisciplinary class project supporting and justifying the name selected. The name proposed must be that of a sea vessel used in research or exploration.

To enter, each team must have a school faculty member act as project coordinator, directing the team's activities and submitting the official program entry packet for judging. Each state, territory, and agency will announce one winner in each of the two divisions in March, 1989; NASA will announce the final winner from each division and the name selected for the orbiter in May, 1989.

Orbiter-naming projects must be postmarked no later than December 31, 1988. For an entry packet, contact NASA Orbiter-Naming Program, Council of Chief State School Officers, Suite 379, 400 North Capitol St., N.W., Washington D.C. 20001; 202/783-5109 or 202/783-5113.

TELECOMMUNICATIONS SOFTWARE BREAKS LANGUAGE BARRIERS

A new telecommunications software package will soon be on the market that will electronically transmit a letter in English to a person in Berlin, Moscow, or Beijing in that person's own tongue. The program will also make it possible to translate from other languages into English.

The Toltran System, say the program's manufacturer, uses artificial intelligence techniques to analyze words singly, as well as in context, in order to determine appropriate meaning. Thus, they say, the system is not only grammatically correct, but coherent in syntax as well.

A Toltran System is expected to cost between $100 and $200. For more information contact Toltran, Ltd., 119D Shoreline Rd., Barrington, IL 60010.
(Circle 106 on Product Info Card.)

GRANT OPPORTUNITIES OFFERED BY TANDY

Proposals for grants in the areas of "Telecommunications in the Classroom" and "Creative Uses of Microcomputers in Education" are now being accepted by Tandy Corporation for its 1989 Tandy Education Grants Program.

All non-profit educational institutions and individuals involved in teaching or research are eligible to apply. Deadlines are December 31, 1988 for the "Telecommunications" grant and March 31, 1989 for the "Creative Uses" grant.

To receive a copy of Tandy's Education Grants Program guidelines, write to Tandy Education Grants Program, 1600 One Tandy Center, Fort Worth, TX 76102.

INCENTIVE OFFER FOR AMIGA COMPUTER PURCHASERS

Any school employee who purchases a complete Amiga 500 or 2000 system from Commodore Business Machines, Inc. between now and December 15, 1988 will receive more than $1,000 worth of software free of charge, including word processing, spreadsheet, data base, desktop publishing, utility, visual presentation, grading, and writing presentation packages. A book, *Amiga Tricks and Tips*, will also be included.

For more information about the offer, contact your nearest Amiga education dealer. To find the one closest to you, call 800/343-3000.

EPIE DATA BASE SHOWS RISE IN EDUCATIONAL SOFTWARE PRICES

Although the median price of educational software has increased more than $5 since 1986 — from $39.98 to $45.42 — there are also more "low-end" programs for educators now on the market, such as public domain and shareware packages, and programs that were developed as the result of special educational projects.

These findings are among those reported in the recently released *1988 Supplement to TESS (The Educational Software Selector)*, produced by EPIE Institute. The statistics come from an analysis of EPIE's data base, which now includes some 10,048 educational software programs — an increase of 2,850 programs since 1986.

Also reported in the *Supplement* are statistics about the number of programs that run on each of the leading computer brands, a breakdown on the number of programs available in each subject area, and a listing of 350 programs, both new and "classic," judged by EPIE reviewers to be among the best.

The *1988 Supplement to TESS* is available as an individual volume ($32.95) or as a specially-priced, two-volume package with *TESS 1986-87* ($59.95). To order, write EPIE Institute, P.O. Box 839, Water

UPDATE

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1989 VERSION OF "ONLY THE BEST" RELEASED

In the 1989 edition of *Only the Best: The Discriminating Software Guide for Preschool - Grade 12*, only 160 educational software programs meet the editors' standards for inclusion as a "highest rated" program. Sixty-seven additional programs released this past year and considered "promising" are also included.

To find the highest-rated software programs for education, *Only the Best* editors rely on 32 software evaluation services in the United States and Canada. A program must receive a minimum of two excellent grades or one excellent and three good/favorable grades from these services in order to be considered. A negative evaluation automatically disqualifies a program for inclusion in the guide.

Out of approximately 11,000 educational programs on the market, say *Only the Best* editors, only five percent have met their standards since the guide began publication in 1985.

Copies of *Only the Best* are available for $24.95 (prepaid), or $26.95 (billed). The price will include an update report, to be mailed in late February, on programs that have received excellent grades since publication of the 1989 edition.

To order *Only the Best*, contact Education News Service, P.O. Box 1789, Carmichael, CA 95609; 916/483-6159.
(Circle 108 on Product Info Card.)

SPECIAL OFFER FOR TERRAPIN LOGO SITE LICENSE PURCHASERS

Any school purchasing a site license of Terrapin Logo for Apple II, Macintosh, or Commodore computers before October 31, 1988, will receive a free copy of Terrapin's *Logo Probability*, a kit containing a student booklet, disk, and teacher's guide (list price: $23.95). To take advantage of this offer, contact Terrapin, Inc., 376 Washington St., Malden, MA 02148; 617/322-4800.

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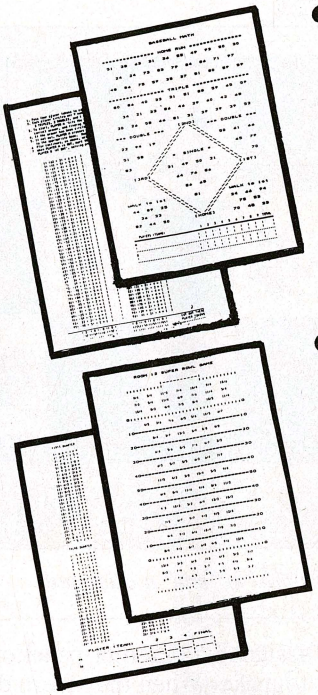

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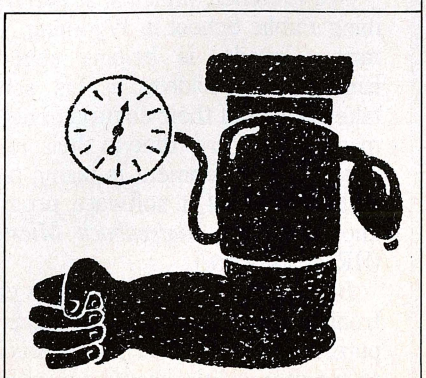
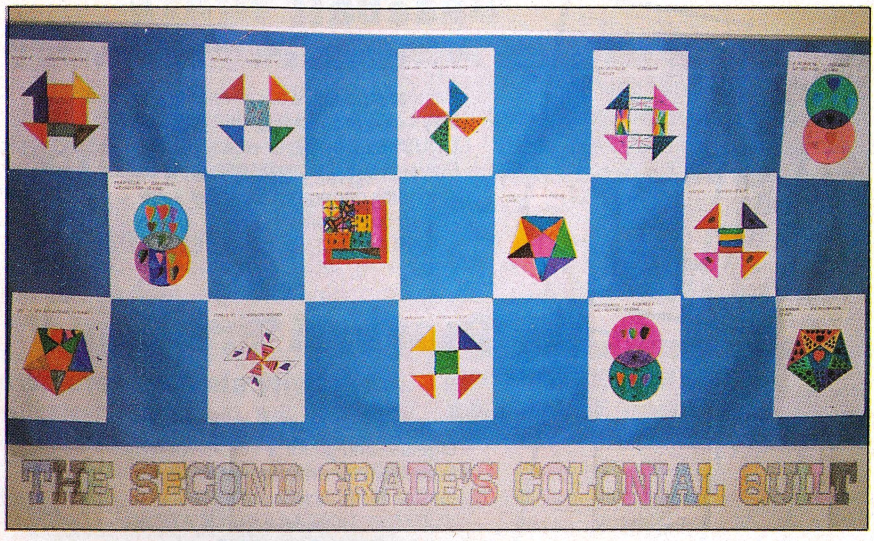


CLASSROOM HAPPENINGS

WHAT'S HAPPENING IN COMPUTER CLASSROOMS



Students in Maryland used Logo printouts and push pins to "sew" a class quilt.

THE LOGO "SEWING" CIRCLE

While teaching her second graders a unit on colonial America, Sharon Reiss-Baker, a teacher at The Harbor School in Bethesda, Maryland, brought to school a quilt that she was sewing based on an authentic colonial design. Her students were impressed. When they mentioned it to their computer teacher, Harriet Block, she suggested that the children use the Logo computer language to make duplicates of the quilt design themselves.

The students set to work enthusiastically, using circle, square, triangle, star, and pentagon procedures as their needle and thread. Each child was assigned a different panel of the quilt to make. When they were done, the children printed out their individual "quilt" pieces and colored them in with crayons. Then they used push pins to "sew" the squares together onto a bulletin board display.

After looking over the older childrens' work, first graders at The Harbor School decided that they wanted to make a Logo quilt too. Since they were studying recursion at that time, they generated designs using the Logo REPEAT command. They printed out their patterns, and pinned together a Logo quilt of their own.

— Jackie Glasthal

COMMUNICATION THROUGH BIOFEEDBACK

Syd Fletcher, principal at the Wyoming Public School in Wyoming, Ontario, Canada, is helping severely handicapped children at his school take control of their environments — many for the first time in their young lives. The experiment is taking place with the aid of a software program known as the *Biofeedback Microlab* (HRM Software).

Biofeedback Microlab includes electronic sensors that attach to the computer, enabling a teacher or student to monitor subtle changes in muscle tension, heart rate, skin temperature, and perspiration rate. The changes are then graphically displayed on the computer screen.

Although the program is most often used with ordinary youngsters, helping them to explore and measure their own physiological functions, Syd has found that it is also useful in helping physically challenged children at the school learn more about themselves and their abilities.

One nine-year-old girl, Anita, for example, has never uttered a word in her life. The only movement she is capable of is lifting one arm over her head. She has to be fed, bathed, and toileted by other people.

Using *Biofeedback Microlab*, however, Syd and the other teachers at the school are starting to learn what Anita really thinks and feels about her environment. When a stranger enters her classroom, for example, she becomes excited. When her mother is present and takes her in her arms, Anita relaxes.

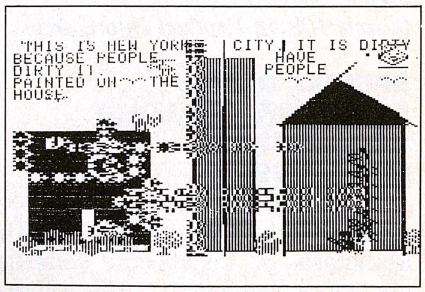
"Even combing her hair elicits a reaction," says Syd. "The next step is to show Anita, and others like her, that they are capable of self-control over bodily processes like heart beat and stress level — simply by thinking about them."

For more information on *Biofeedback Microlab*, which is available for Apple and Commodore computers ($385 includes program disk, pulse rate sensor, skin temperature probe, galvanic skin response sensor, muscle tension sensor, interface box, and Teaching Guide), contact HRM Software, 175 Tompkins Ave., Pleasantville, NY 10570; toll-free 800/431-2050 or 914/769-7496 in New York, Alaska, and Canada.

— Jackie Glasthal

¡HOLA! SPANISH LOGOWRITER

If you think that computer programming is a challenge, imagine if your lessons were offered in a new and unfamiliar language. Students learning English as a second language *and* computer programming face that situation every single school day — but not at P.S. 26 in the Bronx, New



Bilingual children in the Bronx, New York, are exploring their creativity with Spanish LogoWriter. *One especially creative child found a way to make grafitti (above) out of blurs that showed up unexpectedly in his* Spanish LogoWriter *landscape of New York City!*

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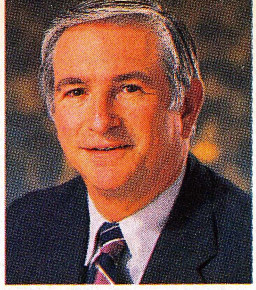

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CLASSROOM

WHAT'S HAPPENING IN

Students in Maryland used Logo printouts and push pins to "sew"

THE LOGO "SEWING" CIRCLE

While teaching her second graders a unit on colonial America, Sharon Reiss-Baker, a teacher at The Harbor School in Bethesda, Maryland, brought to school a quilt that she was sewing based on an authentic colonial design. Her students were impressed. When they mentioned it to their computer teacher, Harriet Block, she suggested that the children use the Logo computer language to make duplicates of the quilt design themselves.

The students set to work enthusiastically, using circle, square, triangle, star, and pentagon procedures as their needle and thread. Each child was assigned a di quilt to make. Wh the children print ual "quilt" pieces with crayons. Th pins to "sew" th onto a bulletin bo

After looking drens' work, fir Harbor School wanted to make Since they were at that time, they using the Logo They printed out pinned together a own.

COMMUNICATION THROUGH BIOFEEDBACK

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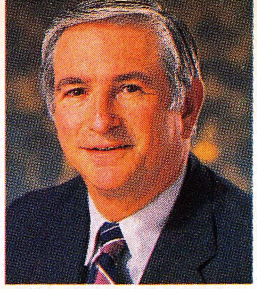
A message from John V. Roach

Global competitiveness in an age of technology begins in the classroom...



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A vital element in future competitiveness is the dedication and excellence of students and teachers. The complexities of today's technology requires engineers and scientists with strong foundations and high levels of intellectual curiosity. In order to help meet our country's challenge, we are going to provide additional recognition and a greater incentive to those high school students and teachers who are willing to make the sacrifices today, so we can be more competitive tomorrow in a world where technology is a major driving force.

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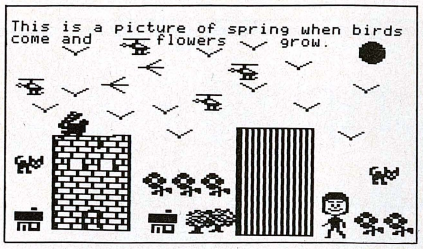
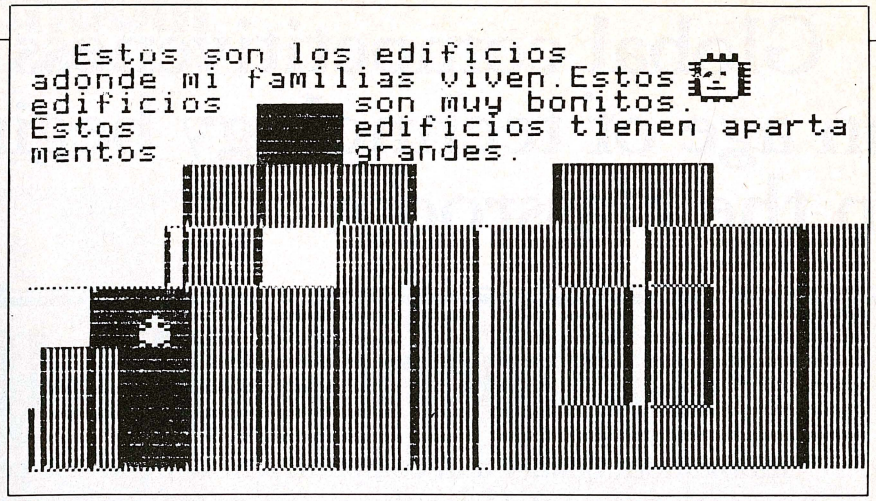
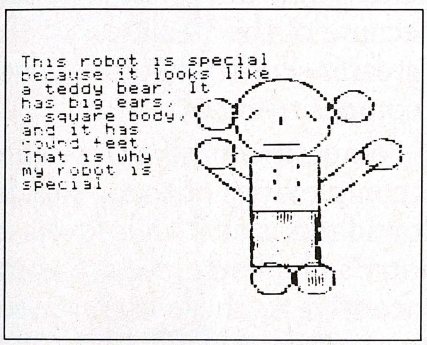
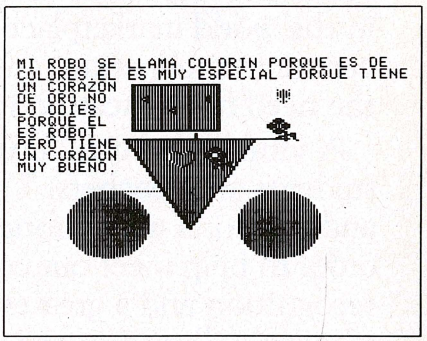








Like the original LogoWriter, *the Spanish version allows students to program Logo pictures and then word process stories to match.*

York. There, bilingual children have piloted a Spanish version of *LogoWriter* by LCSI.

With *Spanish LogoWriter*, as with the original *LogoWriter* program, students draw pictures in Logo and then word process stories to accompany them. Instead of using Logo commands like FORWARD and BACK, however, kids at P.S. 26 type ADELANTE and ATRAS — the Spanish equivalents of these terms. They also have the option of writing their stories in English or in their native tongue.

"Now *I* am the one who is insecure in the language," laughs Terry Rosengart, computer specialist at the school. "Students have to help me as I stumble for the correct word or syntax to use."

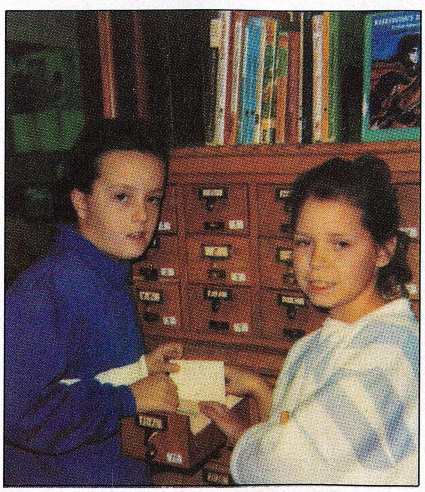
Seeing their teachers as vulnerable allows students in the school's 17 bilingual classes to accept their own mistakes more easily, says Terry. As a result, they seem to take more risks.

Piloting a brand new computer program also forces Terry's students to come up with creative solutions to common programming dilemmas. While using *Spanish LogoWriter* to program a "cityscape" scene, for example, one child found a program bug that caused blurred markings across his drawing. He easily explained the distortions away as New York City graffiti! (The manufacturers promise that the final version of the program, released in August, is free of all such bugs.)

For more information about the program, contact Logo Computer Systems Inc., 1000 Roche Blvd., 9th floor, Vaudreuil, Quebec, Canada, J7V 6B3.

In a similar move to assist Spanish-speaking students, IBM has recently released *Voy a Leer Escribiendo* and *Mi Editor Primario,* two computer-based programs the company has designed to teach kindergarteners and first graders to read and write in Spanish. For information about these bilingual education programs, contact Charles Steele, International Business Machines Corp., 590 Madison Ave., New York, NY 10022; 212/407-3500.

— Adrienne Simpson



Out of the word processor and into the card catalog: Fourth graders contribute their computer-published autobiographies to the Hampton Street School library.

THE LIBRARY GROWS . . .

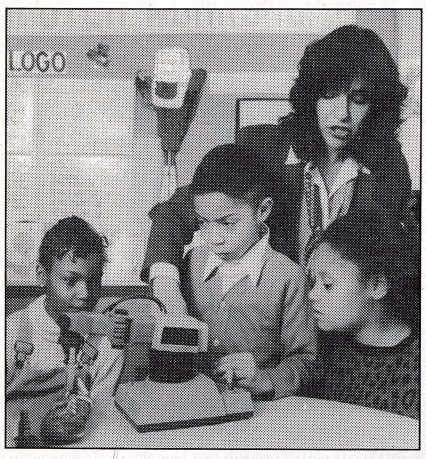
At the Hampton Street School in Mineola, New York, autobiographies of Ken Lew's former fourth graders are shelved beside the life stories of Frederick Douglass, Benjamin Franklin, Helen Keller, Mickey Mantle, and others. The students "penned" their autobiographies last school year using *Bank Street Writer* (Scholastic), under the supervision of Norma Keller, computer teacher at the school. The art teacher, Diane Owen, helped the children create covers for the books and Carol Camarano, the school librarian, showed them how to bind their works into finished volumes.

Each child in Ken's class printed out two copies of his or her autobiography. One was to bring home to parents as a gift for the "home li-

brary." The second was to shelve at the library in school.

As part of the project, each student was shown how to print out an author and title catalog card to add to the school library's card catalog. Others at the school can now look up and access the life stories of their classmates!

— Jackie Glasthal



New York City youth helping a robot learn to tie a shoelace.

TYING KNOTS AROUND A ROBOT

Helping young children learn to tie a shoelace is a challenge. But how do you teach a robot to accomplish the same task? That's what fifteen 9- to 14-year-olds in the Bronx, New York were asking themselves one sultry afternoon this past summer.

The children, all participants in the Police Athletic League (PAL) Logo Computer Camp, spent an afternoon with Dr. Jeanine Meyer of IBM's Corporate Manufacturing staff discussing robotics. After demonstrating the up/down, back/front, and side-to-side "degrees of freedom" that robots have, Dr. Meyer had the children compare their own range of motion.

"Not all robots look like R2D2 or C3PO, either," Dr. Meyer went on to explain. "Are the automatic doors at the grocery store robotic? What about the moving sidewalks at airports?" Questions like these, explains Dr. Meyer, help children really think about robots. ■

— Jackie Glasthal

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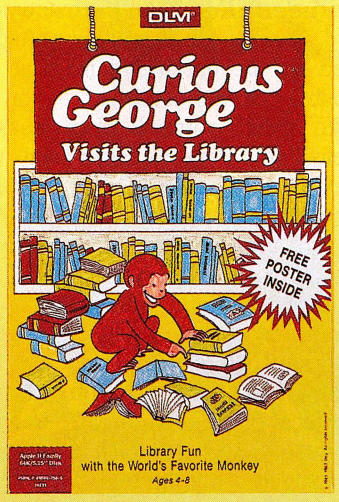

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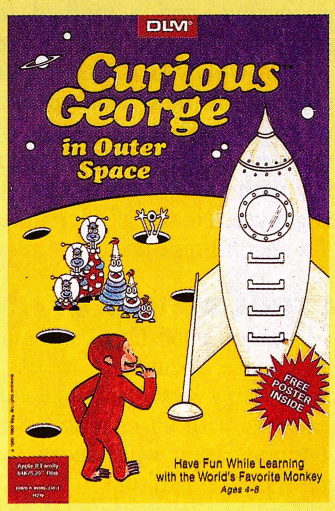

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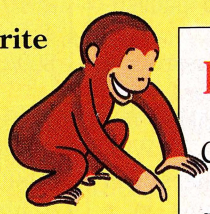

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THE WELL-MANAGED CLASSROOM

COMPUTER SOLUTIONS FOR ADMINISTRATIVE TASKS

Roll the Desktop Presses!

BY DEBRA B. ROACH

The latest revolution in educational computing is *desktop publishing:* the ability to create "print-quality" documents with a personal computer rather than sending manuscripts to a typesetter. Once found only in the Macintosh world, powerful integrated *WYSIWYG* ("What You See Is What You Get") desktop publishing software packages are now available for common classroom machines like the Apple II family (see box below), giving teachers access to all the tools necessary to design, layout, produce, and print professional-looking documents.

Most of the new desktop publishing programs offer the same basic functions, with minor operating differences and wide variations in optional features. Most use Macintosh-like pull-down menus to provide access to all features with the touch of a key or click of a mouse. They all feature drawing capabilities, word processing, and a method to integrate the two on a printed page.

One word of caution: although most of the new desktop publishing programs will work with 128K of memory, some really function well only with additional memory, up to 1 megabyte. Nearly all recommend use of a second disk drive.

A TOOL WITH MANY USES

Desktop publishing can help teachers create documents to use in the classroom every day. It also provides teachers with an economical tool for communicating with peers, parents, and the community.

Here are just some of the ways teachers are using desktop publishing.

Sign-Up Sheets: All classrooms need sign-up sheets for class jobs, book reports, field trips, taking the hamster home — you name it. With desktop publishing, teachers can make sharp-looking sign-ups in a flash. Some packages offer preset formats, or you can design your own. A big plus: you can use icons or graphics to help the pre-reader identify activities.

Worksheets and Overheads: With desktop publishing, producing professional-looking masters for classroom worksheets and overheads is a snap. The printed page is ready for duplication or the thermofax machine to make quick quality overheads. Improved aesthetics create an exciting environment for learning, and the finished product can be updated each year.

Student Records: Permanent record sheets for cumulative folders need not be purchased from an expensive printing company — you can make them yourself with desktop publishing. Report cards and progress reports look professionally done and can be changed easily as circumstances change. At my school, designing a custom document that outlines students' chronological development in the Talented and Gifted program took 20 minutes.

Seating Charts: You can use graphics frames to create a classroom seating chart which can be easily changed using the repositioning option. It doesn't take much muscle to move the tables on the computer screen with the click of a mouse!

School-Community Projects: Desktop publishing is a good platform for projects that involve your students with the local community. Your class might produce a promotional pamphlet for new or prospective residents of your town or city — and learn valuable lessons about communications and media at the same time. Students could conduct appropriate research to include important facts about the town, a map, addresses and phone numbers for local churches, schools, city offices, and utilities, and a listing of local recreational offerings and annual celebrations. Students could add appropriate graphics with a drawing program and import them into the document.

Newsletters: Desktop publishing means you no longer need lots of extra money and personnel to exchange professional information through newsletters and communiques. Not only are the means of production at your fingertips, but you can also develop a reusable format with stock graphics and and frames. Flexibility in adjusting size and position of graphics and text to fit the current document is a real timesaver.

How might you make use of this communications tool?

- An in-house newsletter can help spread the word about what is going on in your school concerning computer use (or any other subject, for that matter). Teachers can brag and share ideas that might not have been dis-

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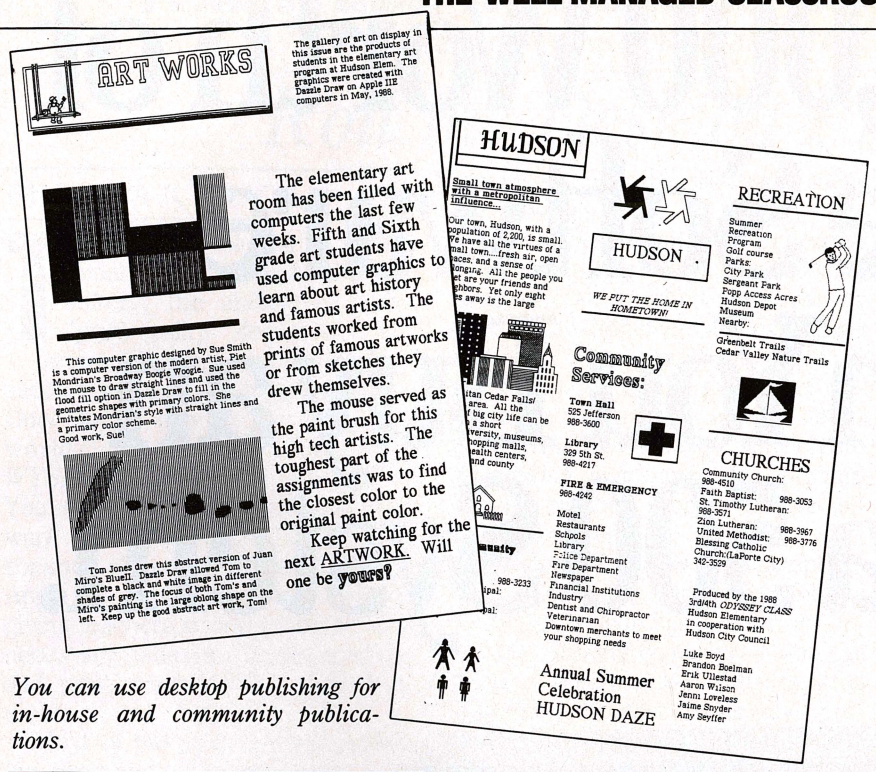

You can use desktop publishing for in-house and community publications.

(continued from page 12)

cussed in the busy teacher day. Student-drawn graphics can be imported or merged with text to display their work.

- A classroom newsletter sent to parents about specific classroom activities is a great public relations tool. Students can help write articles and current events to keep families involved in their child's education. Classroom policies, interviews with classmates, and want ads can all be part of a classroom newspaper.
- Teachers involved in district or statewide professional associations can produce newsletters to reach all relevant faculty members. Officers and committees can supply word processed reports on disk, and the information can be imported in the published document without retyping.

HOW IT WORKS

Here are the basic steps involved in creating any desktop publishing document.

Layout: Begin with a quick pencil sketch of your document, then turn to your software's general layout tools to define the format of the document. Now is the time to make decisions concerning column, text, and graphic positions. In most desktop publishing programs, pages can be divided into a variable number of columns for newspaper-style format. Selected areas of the page for text and graphics are usually designated with frames. These frames can be overlapped, inserted, or situated adjacent to other frames in order to emphasize specific information. In most programs, the layout can be created either in full-size or at a reduced size so that the whole page is displayed; either way, you can scroll the document to view all portions. You'll be able to change the layout later by dragging text or graphic areas to new locations and resizing them; any affected text will automatically readjust.

Text: Word processing is an important part of creating any document. In the new desktop publishing programs, the characteristics of a good word processor are at your fingertips. Multiple font styles and sizes make designing effective pages exciting. The fonts and style can be changed after typing by simply highlighting the words you want changed. All other text will realign respectively. Most desktop publishing programs include special effects such as shadowing, underlining, outlining, and inverse text.

Other features offered by most of the built-in desktop publishing word processors include text search, delete, replace, text, word wrap, and justifications. In many cases, text can also be entered into a popular word processor like *Bank Street Writer* or *AppleWorks* and then imported into text portions of your new document.

Graphics: No more scissors and glue to get professional looking illustrations: creating appropriate graphics while within the program is now a feasible option. Most of the new desktop publishing programs offer a wide range of ready-made "clip art" for decorating your documents, and additional clip art is usually available as well (as in the case of *Springboard Publisher,* which allows you to import graphics from Springboard's *Newsroom Clip Art*).

You can also modify clip art with the desktop publishing program's graphic tools. Drawing tools such as circles, rectangles, free-hand draw, borders, mirrors, and zoom add to the flexibility. You can add your own background and text. Paint-in color or patterns can be transparent or opaque. Different paintbrush shapes and sizes add to creative possibilities. The image can also be resized and reproportioned to fit allowable space within the document.

Another creative option is importing graphics from other drawing programs such as *Dazzle Draw* (Broderbund) or *Paintworks Plus* (Mediagenic, formerly Activision), or from image-digitizing systems like *ComputerEyes* (Digital Vision, Inc.). These take up more computer memory than clip art, so fewer can be used per page. You might recruit students to complete drawings for a document at other computers while the desktop editor is entering text.

Finishing Touches: Add the personal touches that make the document unique. Most desktop publishing programs allow you to create custom mastheads, frame important information, place decorative "dingbats" at the end of articles, and explore other ways of making the document your own.

Printing: Printing the final desktop publishing document is a thrill as the crisp illustrations integrate with a variety of texts. A laser printer is needed to print letter quality or cam-

(continued)

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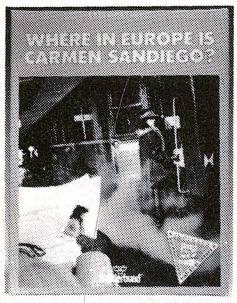

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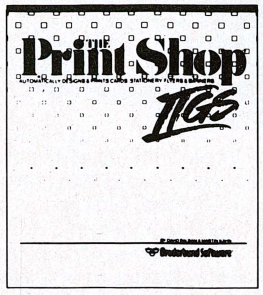

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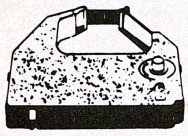

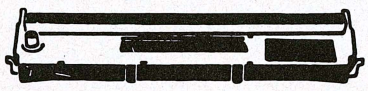

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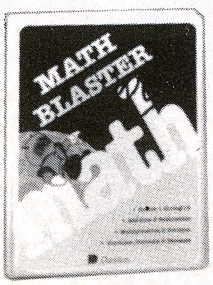

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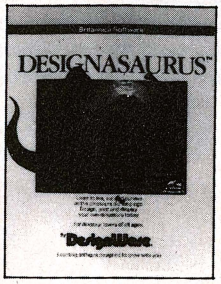

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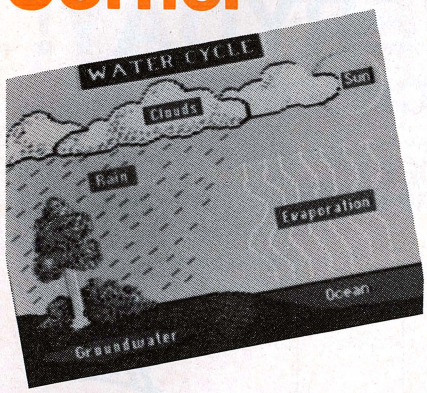
Science Corner



Third- through fifth-graders travel through the Earth's layers, cause evaporation and precipitation, and watch what happens when they rearrange the planets in SVE's interactive *Science Corner.* Users learn many fascinating facts as they explore several different "worlds" of science.

Each program includes an Apple disk, guide, and 12 activity sheets.

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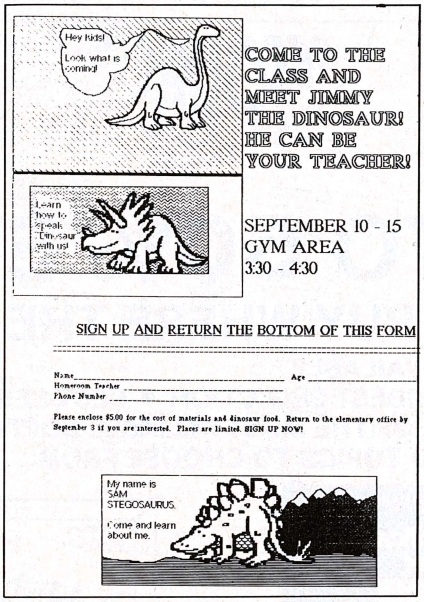


Creating flashy sign-up sheets and overheads is a snap with desktop publishing.

(continued from page 14)

era-ready copy; some desktop publishing programs, such as *Graphic-Writer 2.0,* allow color printing. For most school uses, though, a good dot matrix printer works well with desktop publishing packages. Just make sure you have a well-inked ribbon, so that the printed page is dark enough to reproduce well.

No matter what document is needed, desktop publishing offers an efficient way to develop quality prints. Once you're acquainted with the procedures, the only limiting factor is your own creativity!

Debra B. Roach is Elementary Art Instructor, Talented and Gifted Facilitator, and Elementary Computer Coordinator at the Hudson Community School in Hudson, IA.

TEACHER TIPS
FROM ALL OVER

DATA BASE FOR A SPEECH THERAPIST

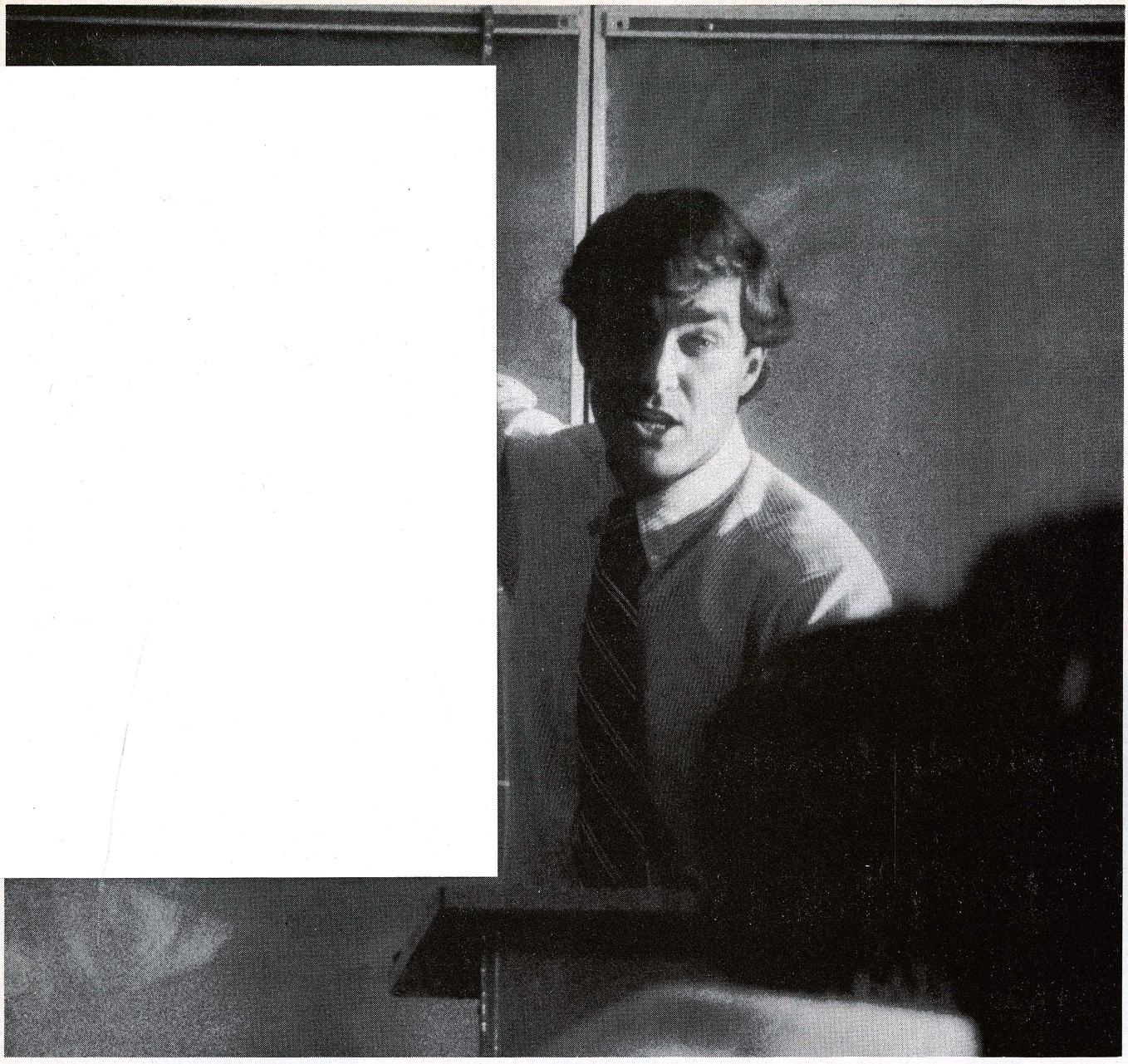
As a speech therapist, I used to feel overwhelmed by the records I was required to keep for various local, state, and federal reports. Someone was always requesting some name or number — and each one wanted the information organized in a different way; some by grade, others by age, or alphabetical order.

To ease the task, I now keep all caseload information in a data file similar to the sample below.

Using this data file, I now find it easy to answer any question, however it's phrased, in a matter of moments. When the school nurse requests a list of students who are due for their next hearing examination, I can create one for her in next to no time at all. And the same holds true when trying to determine which students are ready for their next speech/language evaluation. Even sending progress reports to parents is less of a chore, since I can use the data file to print out "ready-made address labels" in less than half the time it used to take me to do them by hand.

Suzie Bayes
Chesapeake Public Schools
Chesapeake, VA

STUDENT:
BIRTHDATE:
LAST SPEECH EVALUATION:
LAST HEARING EVALUATION:
PARENTS:
ADDRESS:
CITY: STATE: ZIP:
PHONE NUMBER:
GRADE:



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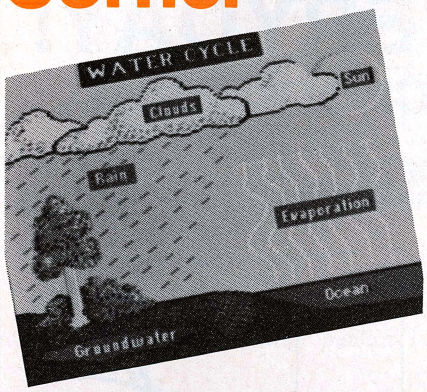

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School

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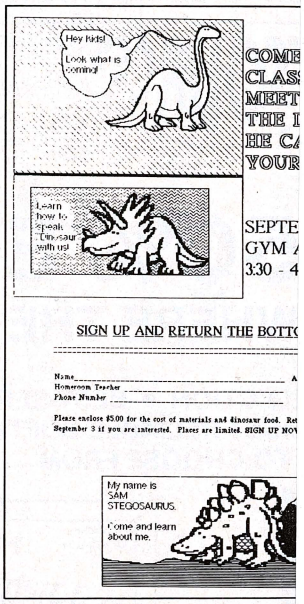

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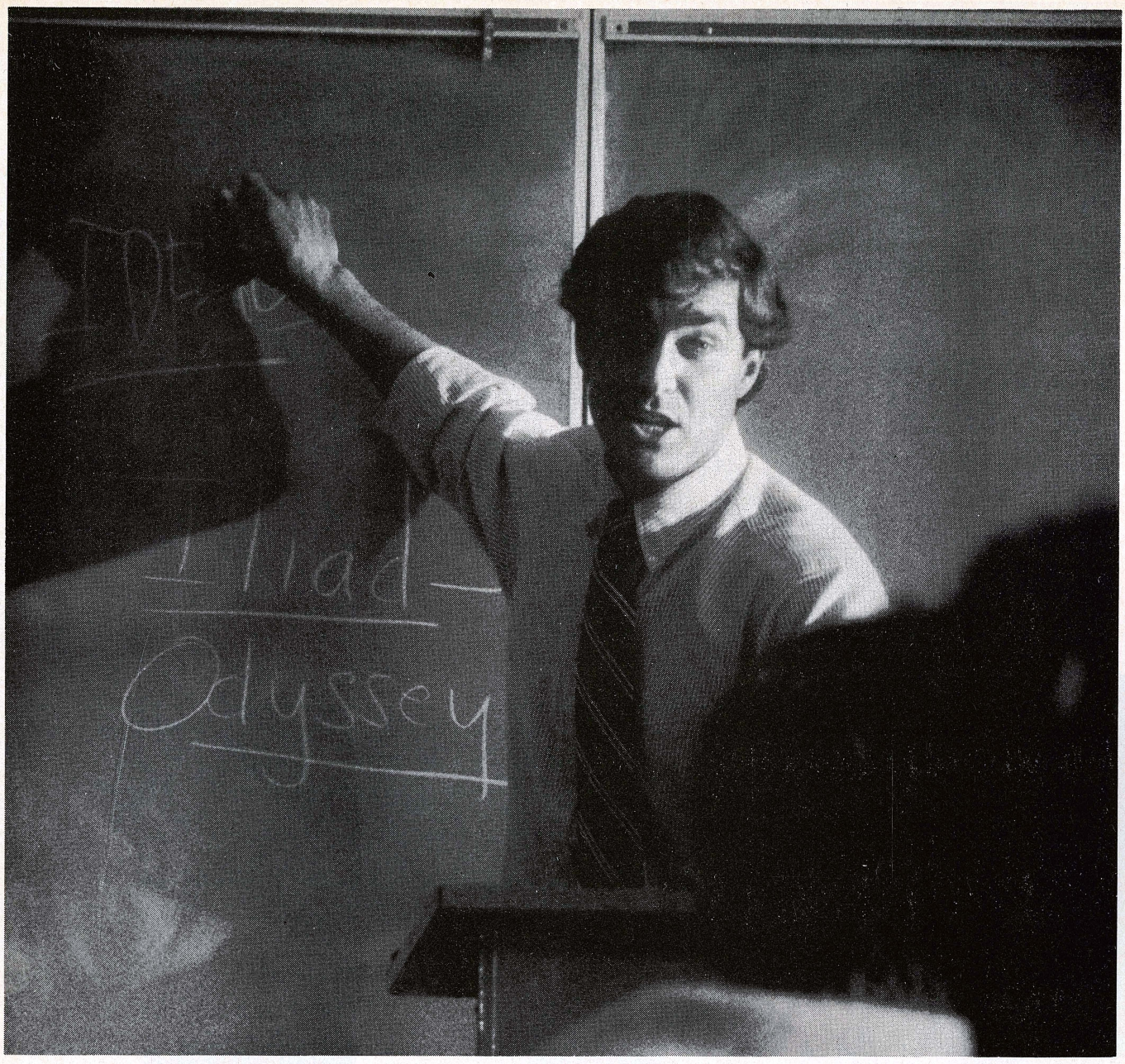

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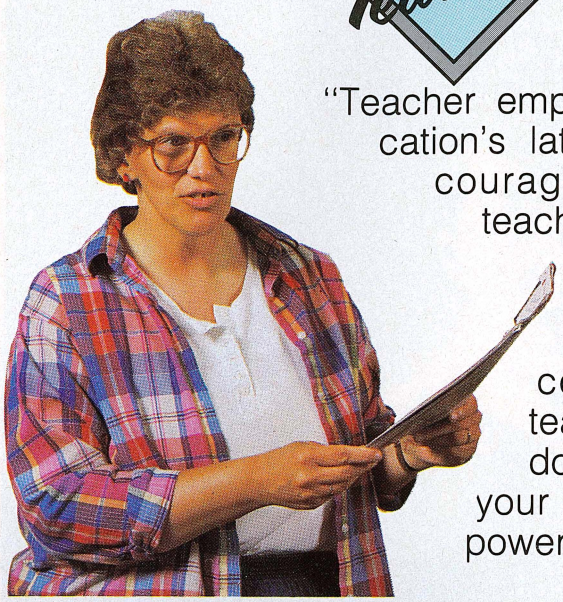
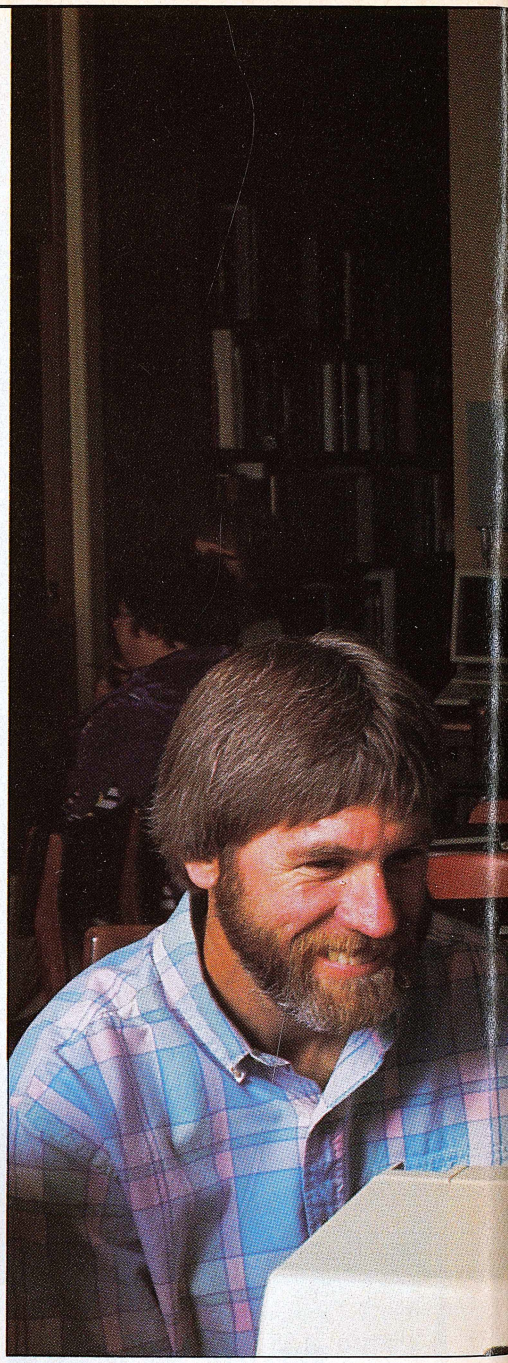
PROFESSIONAL *For Teachers* DEVELOPMENT



"Teacher empowerment" is education's latest battle cry, encouraging classroom teachers to assert themselves as educational and professional leaders. As a computer-using teacher, what can you do to take charge of your own teacher empowerment?



TEACHER POWER IN THE COMPUTER CLASSROOM

BY DORIS RAY

Wally Ziko of Shaw Junior High School in Gorham, Maine is an educational leader in his school and community. In 1982, Wally designed and launched a technology program for his school's seventh and eighth graders. Since that time, his efforts have earned over $30,000 in grant funds and at least that much in local funds for program development. Today, Shaw Junior High operates a fully-networked, state-of-the-art lab of 15 Macintosh computers, a Mac II system, ImageWriter and LaserWriter printers, digital video devices, and projection equipment. After school hours, the Shaw lab facilities are made available for use by Gorham citizens. Meanwhile, Wally and his wife, Cecilia, a third grade teacher, are writing a book about the use of Macintosh computers in helping students develop thinking and communication skills. Wally is also the graphic artist behind the "Gorham Schools Newsletter" and a brochure to recruit community support for a new school building. Wally Ziko is an empowered teacher.

Computer-using teachers like Wally Ziko recognize the potential of technology and the power it affords. These "empowered teachers" are exciting figures: pioneers, innovators, and entrepreneurs in pursuit of educational improvement and personal and professional fulfillment. As they identify and use the power that is available to them, these teachers acquire and develop new sources of power.

As a computer-using teacher, how do you learn to harness power? How do *you* become an empowered educator? Of the many different types of power, you may want to focus on four: knowledge power, support power, resource power, and personal power. This article will tell you how to cultivate all four.

RICK BARRICK

KNOWLEDGE POWER

The old axiom tells us that "Knowledge *is* power." The more knowledge you have, the more value and professional power you assume. Knowledge, in a general sense, includes skills, talent, and experience. If you are the only person in your school who is a master at *AppleWorks*, then you have added value: You are in a position to conduct an *AppleWorks* training in-service session, or to help the school secretary design a data base. If you have developed management strategies that work in a one-computer classroom, then that knowledge might be very valuable to your colleagues who are just beginning to use computers. If you know where to get information about software and hardware, you have a kind of power.

How can you cultivate this technology-related knowledge power? Regardless of your current level of computer experience, there are many options open to you.

You may want to take a course. It is encouraging to note that 80 percent of all the teacher training in computing has been done as in-service programs. An in-

Doris Ray of the Maine Computer Consortium (in plaid shirt) conducts a workshop with computer-using teachers in Cumberland, Maine.

The more knowledge you have, the more professional power you assume.

service program specifically designed for teachers can provide direct, hands-on experience and a good overview of the field. If your school is not offering an in-service computer course, maybe there's enough interest to organize one — usually, about ten teachers is a sufficient number for a session. Talk to the staff development committee. If your school won't do it, other schools often allow local teachers to participate in their courses (or, if you already have experience, they may welcome you as an instructor).

Check with colleges and universities in your region about educational computing offerings that could further your knowledge and skill. If they don't have a course that suits your particular interests or needs, find out about arranging for independent study.

Look into training by computer stores, private consulting groups, and software firms for specific software packages. Some courses may be more expensive than others or have a different focus than you want. Be sure to ask specific questions about how the training will meet your needs.

Try networking with other computer users. Knowledge power is not dispensed only in formal courses. You can learn a great deal from others around you. Computer user groups in your area may sponsor an education special interest group (SIG). If no group has an education SIG, get a few other interested teachers together and start one.

Find a mentor. You probably know someone who is willing and able to offer you guidance and information. It may be a fellow teacher who is a technical genius — or it may be a high school student. These mentor-apprentice relationships can be short- or long-term. In any case, you can learn a great deal from other people's experiences.

Watch for educational computer conferences in your area. They are a great source of new information and knowledge. If there is a national conference scheduled nearby, plan now to request professional time for that event. If you live in the Boston area, for example, the National Educational Computing Conference (NECC), to be held in June of 1989, is an event not to be missed. Visiting the vendor exhibits can provide you with reading, planning, and thinking material for an entire summer vacation.

If you like self-service, don't ignore personal experience as a great teacher! Subscribe to one or more educational computing magazines. Or, take home a stack of back issues from your school library. You'll learn about available resources, get a sense of the hardware and software market, and find out what other educators are thinking and doing.

Take a computer home. You can learn a lot about computing while still in your bathrobe and slippers. If you don't own your own computer, consider purchasing one. Owning your own computer is a kind of power in itself. The investment is worth it. All the major hardware companies have generous educator purchase programs which provide for discounts, and they may have installment plans as well. Some school systems, like the Auburn School Department in Auburn, Maine, have even offered teachers interest-free loans to purchase their home computers, knowing that empowered teachers are likely to empower students.

If you can't buy a computer, borrow one from your school. More and more school systems are encouraging teachers to "adopt" computers for weekends or during vacations. If your school doesn't have a loan program, enough interested teachers can get school officials to consider one.

As you work with hardware and software products, communicate with hardware and software producers and vendors. You can learn a great deal from a phone call. Many vendors, manufacturers, and publishers now have toll-free technical assistance telephone numbers. If you have a question which isn't answered in the documentation, do not hesitate to use these long-distance resources.

Make a particular effort to let software publishers know if you are using their products in interesting or innovative ways, or if you have suggestions to give them. David Field and David Kramlich, Industrial Arts teachers in the Walton School in Auburn, Maine did just that. They were using a product called *CAD Draw* with their students in designing building floor plans. They discovered that the program did not include a means by which students could draw exterior building plans. The teachers developed a library of *CAD Draw* symbols for their students and directions for their use. When they called the publisher, they were invited to put their product on the market.

Do you learn best by teaching others? Does applying a skill boost your confidence? Design, plan, and implement a computer project with your students, then write about it. It all begins with an idea. When junior high school Home Economics teacher Ethel Wright saw an ad for heat-transfer printer ribbons, she ordered one and incorporated computer graphics in her students' T-shirt sewing project. Not only have students learned about their own creative potential, Ethel is now an expert at computer-graphic design.

If you are already knowledgeable about a particular product, or if you have developed classroom activities or strategies, you may want to share your knowledge with other adults. Designing a workshop or course for others also requires that you learn and apply that knowledge. If you have a particular skill with computers, make yourself available to parents, community members, and other teachers. Become a consultant or teach a course that empowers others. Not for free, however — your experience and skills are valuable. Sharing the knowledge you have should include rewards for you, too. Practice thinking of your knowledge as an important economic commodity. Your skill as a teacher is a very marketable one.

Document your own growth and discoveries. Keep a journal and write about your experiences with technology. This will encourage you to really think through the experience from a more objective angle, reflecting on your personal or classroom computing activities, and how they might be improved. Keeping notes on your students' reactions and responses also helps you to examine the curriculum content and process in the light of the technology. Have they learned more? Have they learned differently?

The incorporation of computer technology in education is like no other educational innovation in history because it is you, the classroom teacher, who is at the forefront of this movement. Writing about your computer adventures, particularly those in the classroom, is empowering because you are contributing new information to your profession. Every time you use computers with students, you are doing primary educational research. Your discoveries, your new knowledge is valuable and probably new for others, too.

SUPPORT POWER

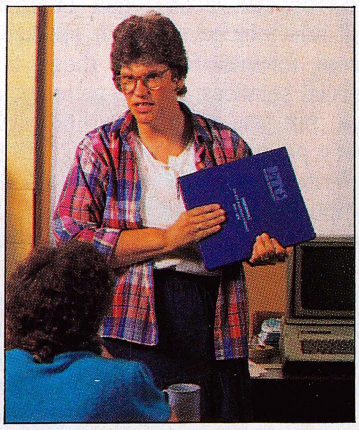
Breaking the isolation barrier is an essential step in empowerment. The largest percentage of a teacher's time is spent in the classroom, often as the only adult. Therefore, every opportunity for collegial exchange with other teachers is a potential growth experience. Teachers also have access to more power if they operate as a group or a network. Gathering support power means taking advantage of what others around you can offer, and it means developing relationships which are mutually beneficial to everyone involved. It's also a lot more fun than "going it alone."

Every opportunity for collegial exchange is a potential growth experience

Investigate computer collaboratives, cooperatives, and resource centers in your area. A state or regional resource center can be a great source of support and information about technology, area course offerings, and what other teachers are doing. Having your name on a collaborative's mailing list can mean stepping into an exciting network of new acquaintances. (For a glimpse of a collaborative in action, see "The Maine Computer Consortium" on page 23.)

Start a new user group. Carl Buciantinni in Auburn, Maine and Daryl Witmer in Monson, Maine both felt isolated. Carl was, as far as he knew, the only Macintosh user in the school system. Daryl, in a rural community, was the only Apple IIGS user. It took a few phone calls and letters, but both managed to get new local user groups off the ground. Carl's group brings together Macintosh-using educators who are interested in administrative applications and desktop publishing. Daryl's group, Northwoods IIGS User Group, now publishes its own newsletter, "The Maine GS Apple Review," that reviews new products, operates a loaning library, and holds monthly meetings.

Form a software support group, short- or long-term. Enlist fellow teachers who would like to learn about specific software. For example, many school systems have the Minnesota Educational Computing Corporation (MECC) software available. With about 30 or so new products released each year, it's almost impossible for one teacher to keep up with it all. A software support group divides the task among its members. Each member becomes an expert with one or two pieces of software. This gives other members resources to call upon should they want to use that software. Such a group also serves as a catalyst for discussion about how the software is best used, what activities might work best with it, and so on.



Take an in-house field trip. It is unfortunate, but true, that teachers often do not know what is going on in the classroom next door. There may be something exciting happening with computers very quietly down the hall. Find out which teachers in your school and district are using computers with students, and ask if you can visit a class in action. Use a free

period, if you have one, or structure an in-house field trip for a professional development day. Not only will you learn from the experience, but showing interest in others' classroom projects can lead to joint projects and lots of new ideas. Try field trips to other schools, too.

Get on-line. Buy, beg, or borrow a modem and connect yourself to the world. Telecommunications is one of the best isolation-busters around. There are many local bulletin board services which are free to users. One phone call can connect you with other computer-users in your area. A little research can reveal whole networks of people who can support your ideas, interests, and who can be valuable sources of information. There are also numerous national information, bulletin board, and electronic mail services which have special interest forums. Some of these commercial services can be quite expensive, but you might find them worth every penny.

Write about your experiences with computers not only to enhance your knowledge power, but as a strategy to gather support power. Writing an article for a school newsletter, a professional journal or magazine, or for a local, state, or regional publication provides visibility for your efforts. When Rumford, Maine's Zayre department store was looking to donate computers to a classroom, they searched for a teacher who had already demonstrated how computers could help students. First-grade teacher Peggy Susbury had made her classroom computer activities visible by writing about them.

By going public with your efforts, you increase your chances of being noticed and supported. By making a regular effort to inform school administrators, other teachers, parents, and community members, you build your base of support. If you believe that computers can make a difference, then spread the word by writing about it. The power of the press can sway public opinion when it comes to voting dollars for computer hardware and software for education.

Buy, beg, or borrow a modem, and connect yourself to the world.

RESOURCE POWER

You have resource power when you determine how to use valuable resources: time, money, people, and information. Often we have more resources and opportunities available to use than we realize. Learning to identify and tap hidden resources, and learning how to use them creatively, is part of the empowerment process.

Time, although always limited, is somewhat under your control. There is probably time available which you are not using. Although the majority of teachers have professional and personal days included in their teaching contract, some school systems do not specify how much professional time is available for use by teachers. If the professional time is not requested, it is an unused time resource. Find out what professional time is available to you, and use it. You have some flexibility and control over how you use that time. Attend a conference. Visit a teacher who uses computers in foreign language classes. Observe students using computers to gather data in the physics lab. Paid professional time is like money in the bank, and is yours to spend.

Money is another resource that everyone agrees is in short supply. How can you influence the amount of money available to you for technology? How can you help determine how money is allocated and spent?

Writing can open doors to financial resources. Apply for a grant. A number of states make available education innovation grants. Some states specifically target funds for use by teachers with good ideas. Other states have monies set aside to fund technology initiatives. Look for matching funds, too. Sometimes you can get half the funding from one source and the remaining half from another.

If your idea isn't funded, don't give up. Review it, rewrite it, and submit it somewhere else. Dan Hester, science teacher at Sacopee Valley Junior-Senior High School in Cornish, Maine wrote two state education grants which were rejected. His local school board was so impressed with his ideas, however, that they gave him enough funding over a three year period to accomplish his grant objectives.

The squeaky wheel gets the grease.

Approach businesses or industry for assistance. Computer companies usually have organized grant programs which award hardware rather than funding. Keep in mind, too, that resources come in all shapes and sizes and not just in check form. Shelly Swayze, Library Media Specialist in Milo, Maine, and six other teachers and media specialists wrote a grant to purchase an in-state WATS line, modems, computers and on-line information service subscriptions for their rural high school libraries. A little extra research led them to an insurance firm in Portland, Maine which gladly let them use their telephone switching system, allowing these small school libraries to make toll-free calls to access on-line data bases. In a large, rural state this means savings of hundreds of dollars for each of the schools involved.

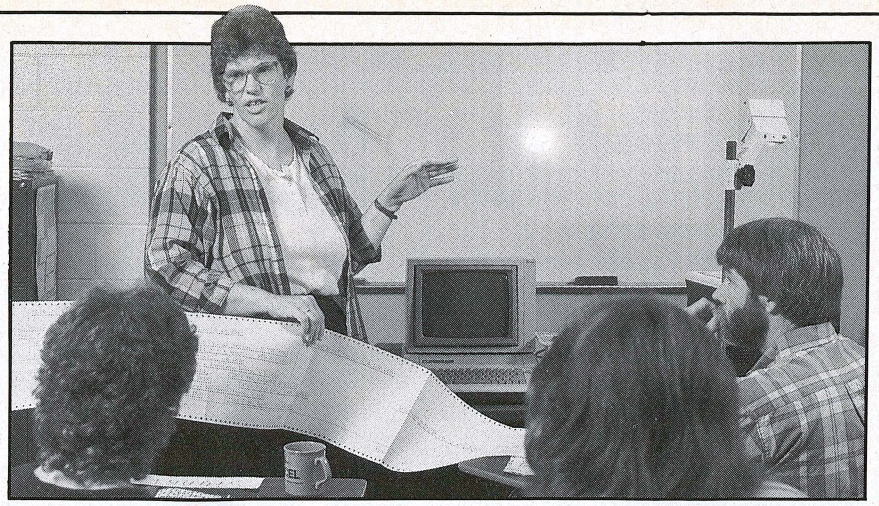
In your eagerness in looking for financial resources and examining alternatives, don't overlook the obvious. Building principals often have discretionary funds which sit waiting for a cause. Parent-teacher organizations are usually eager to help support a good idea. If your computer-related project requires only a modest amount of capital, go ahead and ask for a subsidy. What do you have to lose? And you have resource power to gain.

You can also choose to exercise your power by participating in planning groups which oversee financial resources. Become a member of the school computer committee, the staff development committee, or the parent-teacher organization; you'll have more influence if you are there than if you are not. At least some of the time, it is the squeaky wheel that gets the grease. Volunteering for service in one of these groups gives you a voice in decisions, and first-hand knowledge of budget priorities and financial issues.

Identify under-utilized human resources in your school community. Are there parents or other community members who could serve as vol-

unteers to work with students and computers? Pat Allen found some at the Readfield Elementary School in Readfield, Maine. She developed a volunteer technology training workshop series and now has an army of extra help! Are there computer hardware or software dealers who can offer services, information, or training without cost? Is there an information service for educators in your state? Have you really talked to your school media specialist about technology lately? Are there businesses or community groups who can contribute support, materials, or technical assistance? Think about what others can do for you.

Think of your students as resources. Don't underestimate them! As part of the Environmental Studies Project at Nokomis High School in Newport, Maine, students conduct primary scientific research and com-



puterize their findings. Under the direction of teachers Donald MacDougal and Ken Smith, students have completed an 8.5 mile survey of the Sebasticook River, operate a weather station for the New England Plant and Soils Laboratory, and monitor phosphate levels in tributaries of the river for the Department of Inland Fisheries and Wildlife. Their computerized reports, graphs, maps, and data have not only gained recognition from state environmental agencies — they have saved taxpayer dollars, resulted in jobs for students, and have

(continued on page 24)

THE MAINE COMPUTER CONSORTIUM:

A Collaborative in Action

Educational collaboratives and regional technology centers are important vehicles for empowering computer-using teachers. The Maine Computer Consortium is a private, non-profit educational technology collaborative open to public and private schools within the state of Maine. The Consortium serves over 350 schools in Maine, providing staff and organizational development opportunities, consulting services, and hardware and software support. In addition, it acts as a catalyst for the exchange of ideas, opinions, knowledge and experience in the field of computer-related technology as used in schools. Like many other collaboratives, many of the Consortium's services and activities are aimed directly at empowering teachers to take leadership roles in the area of educational computing.

MEMBERS HELPING MEMBERS

The Consortium sponsors regular regional seminars throughout Maine. It also maintains and supports a network of teacher-consultants who offer regional hands-on workshops for fellow teachers from area schools. These regional sessions may be after school, evenings, during school days, or even on Saturdays. Topics are varied and practical and include such things as: Getting Students On-Line, *AppleWorks*, Teaching Keyboarding to Elementary Students, Computing in the Primary Classroom and The Magic of *MultiScribe*. This network creates an arena for teachers to empower one another.

ME-LINK

Since October of 1986, the Consortium has sponsored and operated an electronic bulletin board and mail system called ME-Link. Four hundred users now use the free service to communicate with one another, to catch up on educational news, to find out about coming events, or to discuss new products with local vendors. With seventeen message boards on-line, ME-Link provides its users with a state-wide network of educators who can offer technical assistance, moral support, and creative ideas. In Maine, the word is now: ME-Links, Therefore I Am.

MASTER'S DEGREE OUTREACH PROGRAM

In the spring of 1987, the Consortium became the sponsoring and coordinating agency for three groups of Maine teachers who wished to formalize their interest in educational computing by pursuing an advanced degree. Seventy-five teachers are enrolled in an outreach graduate program from Lesley College in Cambridge, MA. Lesley College is well-known for its work in the field of educational computing. The Maine outreach sites are among many across the country and overseas. The teachers attend classes one weekend each month at one of three sites in the state: Hampden, Brunswick, and Cumberland. Lesley College instructors come to Maine to conduct classes and meet with students. The courses are project-oriented and designed to meet the needs of teachers. Ken Dow, a Lesley Outreach Program student proclaims: "It's like being in the national guard. We meet one weekend a month to fight computer illiteracy!" A valuable benefit to the program is that the 25 students at each site become a support system for one another. The experience nurtures collegiality and strong friendships among the class members.

earned a $50,000 offer of a grant to continue the work.

PERSONAL POWER

As an individual you have unique strengths and talents which make you personally powerful. There are certain things that you are good at. You may be particularly persuasive; you may have a superior grasp of a subject; or, you might work easily and skillfully with groups of people. Your willingness and ability to use your particular strengths and talents are your personal power. Recognizing and using this personal power is another vehicle that can help you accomplish your goals.

Recognize that your interpersonal, group process, and communication skills may be the most important powers you have. They are essential skills if you wish to influence your school in its integration of computer technology. Empowerment can be a by-product of knowing how to work with others, how to cope with and manage change, and understanding how adults learn best. As an empowered teacher, you will surely affect and influence others around you. The better your grasp of what is happening at personal and social levels, the more your leadership can empower those around you.

USING YOUR POWER

Knowledge, support, resources, and personal skills: sometimes, these powers seem to overlap. You have probably noticed that knowledge power can come as a result of support power, or support power can develop into resource power. These four types of power are not always distinct from one another. The important thing is to recognize them and apply them. This is what empowered teachers have learned to do.

What are the hallmarks of empowered teachers? How can they be recognized? Empowered educators are those who:

- Construct their own learning experiences.
- Enjoy learning and growing.
- Reflect on their own practice.
- Articulate and share their goals and visions.
- Generate and contribute new knowledge.
- Collaborate in significant ways with colleagues.
- Recognize, explore and exploit available resources.
- Cultivate flexibility and take risks.
- Transform problems into projects.
- Pursue their dreams assertively.

When all is said and done, there is no secret path to empowerment. There is no easy recipe or self-help manual. Empowerment is a matter of choosing to use your own capacities for action. As a computer-using teacher, you can choose to be an "empowered computer-using teacher." If you think you can, or if you think you can't — you're right. Unfortunately, after years of teacher isolation, a shortage of financial resources, and hearing our profession bad-mouthed by the press, we succumb too easily to a disability common in education. We teachers become "fantasy impaired." We forget to dream. We forget to think about the knowledge, support, resources, and other powers within our reach every day. We forget, most of all, that we can empower ourselves.

Doris Ray is Project Director for the Maine Computer Consortium at the Maine Center for Educational Services, Auburn, Maine.

PROFILE OF AN EMPOWERED TEACHER

For most of her 19 years in education, writing teacher Beverly Bisbee dreamed of creating an environment where student authors could reach their maximum writing potential. A published poet and writer with a noteworthy background of experiences, Beverly also served as president of the Maine Council of English and Language Arts and was instrumental in organizing and conducting conferences such as the Young Authors Conference at the University of Maine at Farmington. Even her car's license plate, "WRITE," testifies to her belief in written expression.

Five years ago, Beverly was an admitted "technophobe." But after an introduction to word processing and the encouragement to set up her first computer, Beverly refused to let the technical aspects of the machine stop her from using it to reach for her dream.

In 1984, while teaching at the Academy Hill School in Wilton, Maine, Beverly applied for an EDCORE program award from the local International Paper mill. The grant helped her establish and launch a writing workshop for elementary students, and bought one Apple IIe computer. A year later, she enlisted the help of other teachers, supportive school administrators, and enthusiastic parents who had seen the workshop flourish, and wrote a proposal for a Maine Innovative Education Grant. This grant award was matched by her school district.

By the fall of 1986, the writing workshop had been transformed into "The Apple Orchard" and included 22 Apple computers. In addition, there were three Image Writer printing stations and a Wolstein Big Brother local area networking system. This arrangement allowed Beverly's young writers to send written drafts to any other computer on the network.

The Apple Orchard's first year demonstrated that Beverly Bisbee's theories about writing were correct. Students were writing more, writing better, and enjoying their writing. When students' writing was formally assessed on topic development, organization, details, sentences, wording, and mechanics, the comparison of fall writing scores to spring writing scores revealed an increase in all six areas. Further analysis of writing scores revealed that writing differences between boys and girls had narrowed.

Today, the daily schedule of The Apple Orchard is saturated, serving over 200 students from seven grade levels and four schools. A third grant award opened The Apple Orchard for community use on Wednesday evenings. The Apple Orchard has become a training ground for both university students and educators in other school systems. Educators from schools that are planning to build computer labs or those who plan to implement a new writing program often visit Beverly's program.

Beverly's vision for her school system is that one day the entire district will be networked for electronic conferencing and access to a variety of data bases. As for herself, Beverly claims that she has never been happier since she began teaching.

— Doris Ray

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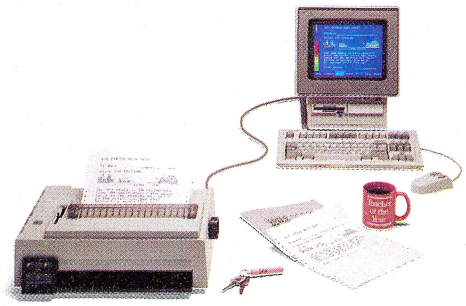

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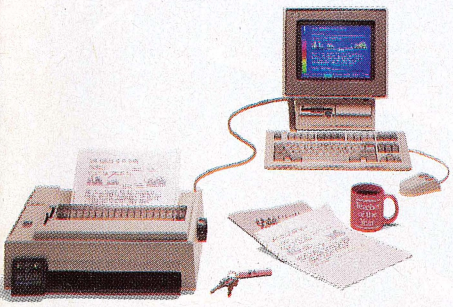

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CLASS PROJECT

BY MICHAEL S. SCHNEIDER

COUNTDOWN STARGAME

MARK MATCHO

STARDATE: 2188

YOUR STUDENTS ARE part of a world famous space exploration team when, suddenly, disaster strikes! By working together, the children may be able to save the spaceship and its crew members. *But can they do it?*

In this teaching unit, students form cooperative learning groups to work through a prototype BASIC space adventure based on the premise above — then create new adventure programs of their own. In the process, they'll learn all about the planets of our solar system.

Even if your students aren't ready for BASIC programming, they can still use the STARGAME adventure to learn cooperatively about the makeup of our solar system and the planets within it. Instructions for using this project with non-programmers appear on page 41.

Although the emphasis of this teaching unit is the solar system, the prototype program can be used to create computer adventure games appropriate to any subject area — literature, the human digestive or circulatory

Whether you're teaching about the solar system, BASIC programming, or both, there's a universe of knowledge for your students to explore in this cooperative learning adventure!

CURRICULUM CONNECTIONS

Science

Learning about the solar system. Using data charts and tables.

Thinking Skills/ Computer Literacy

Introduction to BASIC programming. Creating simple flowcharts.

system, the history of the Alamo, or the workings of a classroom personal computer.

PREPARATION

Photocopy the chart on page 30 for each child in your classroom. (Depending on students' age and ability levels you may want to simplify the chart before distributing it.) Type in the BASIC program on page 41 and run it to make sure that it works properly. (The program is written for Apple II series computers. If you have an IBM-PC or compatible, substitute the HOME command in lines 10, 65, 100, 135, 200, 245, 300, 340, 400, 440, and 500 with the command CLS. If you have a Commodore 64 or 128, replace these same lines with the command PRINT CHR$(147);.) Save the program on a disk under the file name STARGAME.

If students will be programming their own adventures, make a printout of this program and photocopy it for each child in your classroom. To understand how this program works, and use it as a prototype for their own solar system adventure "games," students must learn a few simple BASIC commands. Definitions for these are on page 32.

COUNTDOWN TO ADVENTURE PROGRAMMING

To have children carry out their own cooperative solar system adventures, "count down" through the following steps.

FORM COOPERATIVE LEARNING GROUPS

Cooperative learning is a powerful classroom strategy. It is based on the notion of *positive interdependence* — the idea that individual members of a group cannot reach their own goals unless all members of the group succeed. When the cooperative learning group is structured properly, students work together to maximize their own learning *and* that of fellow classmates through discussion, assistance, and encouragement.

When setting up the cooperative learning teams, group students with others of diverse abilities (good math students with good English students, and so on). Be sure that each group contains males and females and, if possible, students of different races and cultural backgrounds.

Forming equitable cooperative learning groups is not difficult. Many teachers find that often, by assigning students to groups randomly, heterogeneous crews are naturally formed.

For the purposes of this teaching unit, your "Solar System Adventure Squad" cooperative learning groups should consist of no more than five students each.

SELECT INDIVIDUAL ROLES

One way to establish a feeling of cooperative interdependence among students is to have each child accept one or more responsibilities related to his or her whole-group goal. For example, within each Solar System Adventure Squad, have each child select from among these five "interdependent" roles:

The encourager makes sure that everyone in the group has an opportunity to express his or her opinions. He or she is also responsible for spreading a positive attitude among the crew.

The note taker takes notes on group discussions and records ideas and final decisions on all matters related to group goals.

The reader is responsible for reading aloud materials that are distributed to the group, and makes sure that each group member understands these materials.

The fact checker makes sure that any information that will be programmed into the computer is factual and correctly stated.

The program checker checks to make sure that students typing commands, statements, and answers into the computer are doing so exactly the way that the group has agreed. He or she is also responsible for editing out typing errors.

In addition to these five roles, tell students, each child will take a turn as **the typist**, typing in whatever programming commands and statements the group agrees upon.

DEFINE INDIVIDUAL AND GROUP GOALS

Once the Solar System Adventure Squads have agreed upon a role for each of their members, explain to children that each squad will be working through a computer game program and then devising a game of its own. Emphasize to the children that the members of each squad are equally responsible for their group's final product — no matter which role each child has selected to play.

Moderate a class discussion on the responsibilities of each squad member, and make sure students understand the equal importance of all of the roles. No one should take a job that he or she considers truly unimportant, tell students. If they discover in the course of the project that one or more of their team roles is unnecessary, they will have the freedom to suggest alternative roles for group members to play.

REVIEW THE DATA CHART

Distribute to each child a copy of the solar system data chart on page 30 . If possible, enlarge an additional copy to post on a classroom bulletin board.

The information on the data chart will be used to navigate the solar system adventure game and to develop quiz questions for their own solar system adventure games, tell your students. Test the childrens' ability to read the chart by having children answer questions that you pose based on chart information. For example:

- Which planet in our solar system is three-quarters covered by water? *(Earth.)*
- Which has almost no atmosphere? *(Mercury.)*
- Which is the coldest? *(Uranus.)*
- Which has the most moons? *(Saturn.)*

Once they have the idea, give kids an opportunity to use the data chart to pose questions of their own for classmates to answer. Can the children pose questions that rely on information from two or more chart categories — such as: which planet, more than 100,000 km wide in diameter, is also known for the wide rings that surround it? *(Saturn.)* Can children come up with questions based on data that is not directly stated, but can be deduced from information on the chart — such as, which planet has the widest temperature range? *(Respondents would need to do the math to come up with the correct answer — Mercury.)*

RUN THE PROTOTYPE PROGRAM

Working with their Solar System Adventure Squads, have the children run the STARGAME program that you

have typed onto a disk. (If you have enough computers available for teams to work at the computer simultaneously, make a copy of the program disk for each group.) Allow children to use their data chart to answer the questions asked in the program. There are five questions in all — enough so that each child has a chance to type in an answer at least once.

Remind students of the roles that they have selected: the reader should read the information on the screen aloud, the encourager should make sure that everyone is in agreement on an answer, and the program checker should verify that what is typed into the computer is exactly what the group has agreed upon.

In addition to providing students with practice using the data chart, this exercise will give children an idea of the type of computer program that they will soon be writing. It will also serve as a "getting-acquainted" activity for the members of each cooperative learning squad.

ANALYZE THE PROTOTYPE PROGRAM

Distribute to each child a copy of the printout of the BASIC prototype program. Have each squad analyze the programming statements that appear on the page. Write the following questions on the chalkboard for the members of each cooperative learning group to discuss among themselves:

- What similarities and differences does your group find among different lines of the program?
- What does your group think each of these programming commands might lead the computer to do:

HOME:
PRINT:
INPUT:
GOTO:

- Do you see any lines in the program that are repeated? Does there seem to be a pattern to the program as a whole?

Again, remind the children of their individual roles when working cooperatively. Assure the students whose roles are not yet needed (the program checker and fact checker) that they soon will be. In the meantime, tell children, these students should be as involved in group decisions as are other members of the team.

HOLD A WHOLE-CLASS DISCUSSION

Have the note taker from each squad report in a whole-class discussion his or her group's theories about the BASIC program. What do the groups believe different lines in the program will lead the computer to do? Are students in agreement, or do differences of opinion exist? Help the children correct any faulty conclusions that they have reached. Then, help students make a poster of the BASIC commands on page 32. Display the poster on a bulletin board in your classroom. If you like, give children the opportunity to experiment with line changes, using the prototype program disk. Be sure, however, that if the children wish to save these changes, that they do so under new file names. (In this way, explain to your students, the original version of the program will not be lost.)

Before ending your class discussion, ask students to describe any problems that they ran across while working with their adventure squads. Most experts agree that having students analyze the cooperative process is essential to the development of "work-together" skills. Are all group members participating fully? How might group productivity and interaction be improved?

DESIGN NEW PROGRAM SCRIPTS

After running the prototype program, analyzing a printout of it, and participating in a whole-class discussion, your students are now ready to outline program scripts of their own. First, each team needs to select a "mission" that players of their program will be facing. What planets will be visited during the course of the game? What questions will programmers ask in order to lead the players to these planets?

Each adventure squad should limit itself to five questions about the planets. Students may want to use library resources in addition to the data chart to create these questions. The encourager should make sure that each member of his or her adventure squad has a part in contributing at least one idea used in the team's adventure program. Later, kids can go back and add additional questions if they wish.

CREATE NEW PROGRAM "FLOWCHARTS"

Using a graphics program such as *Print Shop* (Broderbund), *SuperPrint* (Scholastic), or *Print Master* (Epyx), or crayons and paper, have the members of each solar system adventure crew "map out" its adventure on paper. (*Time Liner* by Tom Snyder Productions, along with crayons or markers, can also be used.) Each team must decide at this point on the "path" that players will follow in order to complete its adventure. They must then indicate that path through the drawings that they create.

To "map out" their adventures, each cooperative learning group has two options. Children can either include in their drawings only those planets that players will be visiting, or, they can include all nine planets,

and then indicate with numbers or other symbols the ones that players will be going to during the course of their games. Either way, the maps that your students create will serve as very simple "flowcharts," or diagrams of the route that their BASIC adventures will be taking.

Should each solar system adventure squad select one mapmaker to create its diagram, or should each adventure squad member participate? Let the individual groups decide. You may want to suggest, however, that each student draw the illustration for a part of the program that he or she has contributed.

When a Solar System Adventure Squad has completed its "flowchart drawing," the diagram should be passed on to that group's fact checker for verification. When he or she has "okayed" the diagram, create a wall display of these.

PROGRAM THE NEW ADVENTURES

Programming is a shared role, tell students. Although each child will take a turn at the typing, the entire group must first agree on what it is that will be typed.

Using the prototype program as a guideline, have each squad of students develop its own computer program. First, they will need to substitute a unique "script" for the words between quotation marks after each PRINT statement in the prototype. If the script is longer or shorter than the prototype, children must insert or delete line statements accordingly. They must also take care that the PRINT statements that they have written are inserted into appropriate portions of the "script."

There are other program changes to be taken into consideration as well, remind students. For example, do the GOTO commands still refer the computer to the correct program lines, depending on whether a correct or incorrect answer has been input? Have the program checker in each group double-check that the GOTO statements go where the programmers want them to.

When each squad is pleased with its adventure program, have children divide their programs into five "blocks" of equal length. Have children take turns typing in these blocks. The lines need not be typed in any particular order, tell students. As long as line numbers are given,

SOLAR SYSTEM DATA CHART

Planet	Core	Surface	Atmosphere	Fast Facts
MERCURY	Iron, nickle, rock	Lava, craters, plains, cliffs	Almost none (traces of gases)	Quickest planet.
VENUS	Iron, nickle, rock	Hills & mountains, craters, cliffs, volcanoes	Carbon dioxide, sulfuric acid clouds	Has constant thunder, lightning, fast winds, acid rain.
EARTH	Iron, nickle, rock	Hills, mountains, plains, oceans, ice, volcanoes.	Mostly nitrogen, oxygen, & trace gases	Covered ¾ by water, has living creatures.
MARS	Iron & rock	Mountains, canyons, craters, cliffs, volcanoes	Carbon dioxide & trace gases	Pink sky, biggest volcano, largest canyon, dry-ice caps.
JUPITER	Rock	Metallic/liquid hydrogen	Hydrogen gas, traces of helium, methane, & ammonia	Has thin rings, Great Red Spot storm larger than 3 Earths.
SATURN	Rock	Metallic/liquid hydrogen	Hydrogen gas, traces of helium, methane, & crystal ammonia	Famous wide rings
URANUS	Rock & ice	Metallic/liquid hydrogen	Hydrogen gas, traces of helium, methane, & other gases	Green sky. Has thin rings.
NEPTUNE	Rock & ice	Metallic/liquid hydrogen	Hydrogen gas, traces of helium, methane, & other gases	Blue sky. Has thin rings.
PLUTO	Unknown	Methane ice	Methane gas	The sun looks like a distant star.

the computer is able to rearrange these into correct sequence by itself.

As the children type, the program checker should be looking on, making sure that no typing errors appear in the program. When it is the program checker's turn to type, another team member — such as the fact checker — should temporarily take on the role of program checker for that child.

Have each group save its adventure on a disk under an imaginative file name of its choosing.

When the children believe that all the program bugs have been removed from their programs, have each crew run its own adventure game. Does the program work exactly as the children had suspected that it would? Chances are, alas, that it will not. Allow students to work with their group members to find and correct any "bugs" that appear in their programs. The children must then remember to save these revised versions before shutting off their computers — else the new versions will be lost.

Many children, believe it or not, will find debugging their computer programs an enjoyable challenge — and an educational one at that!

THE ADVENTURE CONTINUES: EXTENSION ACTIVITIES

1. Hold a program playoff. If your students are pleased with their adventure programs, their first thought will be to show them off to classmates. Have the students go right ahead! Challenge the teams to play their classmates' adventure programs. Can the children complete these programs without referring to the data charts? Any program bugs that are encountered, tell students, should be immediately reported to the squad that created the program.

If you have access to only one computer, load a different adventure into the computer every day, and give each squad an opportunity to run it. If you have access to a computer lab or as many computers as you have adventure programs, load a different program into each machine. Then, have the squads rotate, and take a turn at using each one.

Since the goal is to complete the adventures in the least number of turns possible, use a wall chart to

Average Distance from Sun (million km)	Diameter (km)	Period of Revolution (year) *	Period of Rotation (day) *	Number of Moons	Temperature Range	Gravity	Angle of Tilt (degrees)
58	4,878	87d	58.6d	0	-180° C to +427° C	.38	28
108	12,104	224.7d	243d	0	+453° C to +487° C	.91	3
150	12,756	365.26d	23h 56m	1	-90° C to +58° C	1.00	23.5
228	6,786	687d	24h 39m	2	-123° C to+ 27° C	.38	24
779	143,800	11.86y	9h 48m	16	-150° C to -100° C	2.5	3
1430	120,660	29.5y	10h 14m	22	-180° C to -156° C	1.07	27
2870	52,290	84y	13h to 24h	15	-200° C	.93	97.5
4595	48,600	164.8y	16h 48m	2	-188° C	1.2	29
5920	3,060	247.7y	6.4d	1	213° C	.03(?)	65

* y = years, d = days, h = hours, m = minutes

record how many moves it takes each team to complete each adventure program. What was the class average using each program? Which was the most difficult to complete? Which one was easiest? Why do students think that this was so?

2. Make a space exploration time line. Now that they know what it's like to be a "space traveler," have students research the real history of man's quest for the stars. Depending on your students' ability levels and interests, you might focus the timeline on recent history, beginning perhaps with Sputnik I, the Soviet Union's first artificial satellite to circle the earth, launched on October 4, 1957. Or, as a tie-in with Columbus Day, what great space dates has our world seen seen 1492? Among these: Copernicus released his theory that the sun is the center of the universe, and that the planets all revolve around it (1543); Galileo built his first telescope (1609); the planet Uranus was discovered (1781).

Students can illustrate their timeline using a graphics program or crayons. The timeline can also be used to help link this science unit with your social studies curriculum.

3. File that data! How might the information on the solar system data chart be entered into a data base program? Would this make the information easier or more difficult to access?

By devising a different data record for each planet, and a different data record field for each category of information on the chart, students can experiment with a data base program to answer adventure program questions, and to devise original questions of their own. By sorting and searching through combinations of data, children will come up with interesting and complex planetary characteristics that they can then put to use to expand their BASIC solar system adventure games.

4) Graph the planets. Software programs such as *AutoGraph* (SVE), *Visualizer* (PBI Software), *EasyGraph* (Grolier), *and MECC Graph* (MECC). allow students to input and graph numerical data, bringing a "visual feel" to the information that they are working with. Bar graphs that show the diameters of the planets, their relative tilts or numbers of moons are easily made, as are pie charts that show the relative pull of gravity, or line graphs diagraming more complex phenomena, such as the average distance of a planet from the sun compared to that same planet's period of revolution. How many other related charts and graphs can your students think of to create?

Michael S. Schneider is a freelance consultant, writer, and developer of educational products in New York specializing in science, math and computers.

To adapt this class project for special needs students, see page 42.

THE BASIC COMMAND STATION

Here are the BASIC commands that your students will need to create their own solar system adventure programs:

HOME (Apple), **CLS** (IBM), or **PRINT CHR$ (147)**; (Commodore): these commands clear the computer screen and position the cursor in the upper lefthand corner. In the STARGAME program, the command is used to clear the screen each time a user answers a question — whether the question is answered correctly or not.

PRINT: This command tells the computer to print whatever characters are enclosed between quotation marks after the **PRINT** command.

INPUT Q(NUMBER)$: The computer responds to this command with a question mark symbol, and then waits for the program user to input a response. The dollar sign symbol — or *string* — tells the computer that the answer to be input corresponds with the symbols between quotation marks in the **IF . . . THEN** statement (see below). Have students note that the same variable name (**Q1$, Q2$, Q3$**, and so on) is never used twice.

K=K+1: This seemingly illogical math statement acts as a "counter" for the computer. It silently counts the number of steps it takes for a user to correctly answer the questions in the program. Every time this line is encountered, the computer increases the count by 1. (Note that in line 5, the counter was set at zero.) At the end of the program, this counting function is used to tell a player how many inputs he or she has used to correctly answer the questions.

IF Q(NUMBER)$="__" THEN GOTO __: This line in a computer program is known as an "**IF . . .THEN** statement." It tells the computer to compare the input in **Q(NUMBER)$** (see above) with the characters between quotation marks on this line. It then tells the computer what line number to proceed to, assuming that the conditions listed in the **IF** part of the statement are met. Note how literal it is! The first blank on this line should be replaced with the answer that the programmer is seeking. The second blank should be replaced with the line number that the computer will go to if the answer being sought is input.

GOTO __: Again, this command sends the computer to a specific line number. In the STARGAME program it is used on a line by itself when a game player is being sent back to reread a question after answering incorrectly.

END: This command is needed in every BASIC program. It tells the computer that the program is at an end.

NOTES

HOW TO USE THIS LEARNING CENTER SUPER PAGE

TEACHER'S GUIDE

This issue's Learning Center Super Page is designed to spark interest in the upcoming national election, and to help students understand the ways in which computers have affected our election process. On this flipside of the Super Page are three worksheets to use in conjunction with the Super Page.

SETTING UP THE LEARNING CENTER

The Learning Center Super Page is designed for your students to interact with independently, either individually or in small groups. The Super Page and accompanying materials can form the basis of a classroom Learning Center on the elections; you should feel free to add to and expand upon them. After introducing the Super Page activities to your class (see below) and photocopying a sufficient supply of the worksheets, hang the Super Page in your computer corner or a designated area of your computer lab. The Super Page should be positioned so that it is readable by students seated at the computer.

Materials Stock the Learning Center with word processing software; a data base management program; a graphing program such as *Easy Graph* (Grolier), *MECC Graph* (MECC), or *SVE Autograph* (Society for Visual Education); (optional) a survey-taking program such as *Survey Taker* (Scholastic) or *Surveys Unlimited* (Mindscape) which includes a graphing function; a children's desktop publishing program such as *The Newsroom* (Scholastic or Springboard); a graphics/printing program such as *The Print Shop* (Broderbund); a spreadsheet program; blank, formatted data disks for student use; and, if possible, a selection of the supplementary software listed below. Also place in the Learning Center one or more almanacs, American history textbooks, and election-related magazine or newspaper articles.

You may wish to use a puzzle-making program such as *Crossword Magic* (Scott, Foresman) or *Wordzzzearch* (Mindplay) to create word puzzles for the Learning Center related to the Super Page and the 1988 election in general.

Place copies of these puzzles and your supply of worksheets in the Learning Center for students to complete as assigned, and provide plenty of blank paper for student notes.

INTRODUCING THE SUPER PAGE

The Super Page is made up of five main sections.

Campaign Computing Read through this section with your class before beginning a general discussion, and make sure students understand such terms as *campaign staff, parties, data banks,* and *polls.* The second half of this newsline report discusses how computers help project election winners, which has altered voting patterns — voters in California and Hawaii have reportedly stayed away from the polls in the late evenings because a winner has already been projected! Children should be encouraged to ask questions and share their opinions about the ideas in this section.

Election Oddities These "Fast Facts" provide children with a variety of information about elections from the past. How deeply you discuss this section depends how much American history the children know and what your instruction plans are regarding the present election. Do encourage students to seek out additional political "trivia" to add to their computer-made encyclopedia.

Take a Poll Break and **Graph the Returns** Help your students set up a data base poll or use a survey-taking program to determine how many students are for each major candidate. Your students might want to conduct several polls over the course of the next few weeks, including one or more polls reflecting the "Voter Viewpoints" activity, below. You may also want to poll other classes. Using a graphing program or the graphing function of your survey-taking software, have children illustrate the outcomes of the polls. Discuss which of the types of graphs best illustrate which kind of poll data.

Voter Viewpoints This section encourages students to think about the campaign and the candidates from different points of view. Although the activity is designed to be carried out primarily in writing, via the word processor, your may choose to have students compare their "Voter Viewpoints" verbally.

USING THE WORKSHEETS

Before using the worksheets, adapt them to meet your own needs and the skills of your class. For Worksheet Number 2, use the paper spreadsheet as a model to set up a spreadsheet template on a disk for students to experiment with.

SUPPLEMENTARY SOFTWARE

And If Re-Elected. . . for the Apple II family, $65, Focus Media, 839 Stewart Ave., Garden City, NY 11530, 800/645-8989 or 516/794-8900.

Electoral College & Primary Fight for Apple II, TRS-80 Model III and 4, $49.95, Krell Software Corp., Flower Field Bldg., No. 7, St. James, NY 11780, 516/584-7900.

Presidents for the Apple II family ($39.95) and IBM-PC ($49.95), Hartley Courseware, 133 Bridge St., P.O. Box 419, Dimondale, MI 48821, 800/247-1380.

Polls and Politics for Apple II family and IBM-PC, $39, MECC, 3490 Lexington Ave. N., St. Paul, MN 55126, 612/481-3500. ■

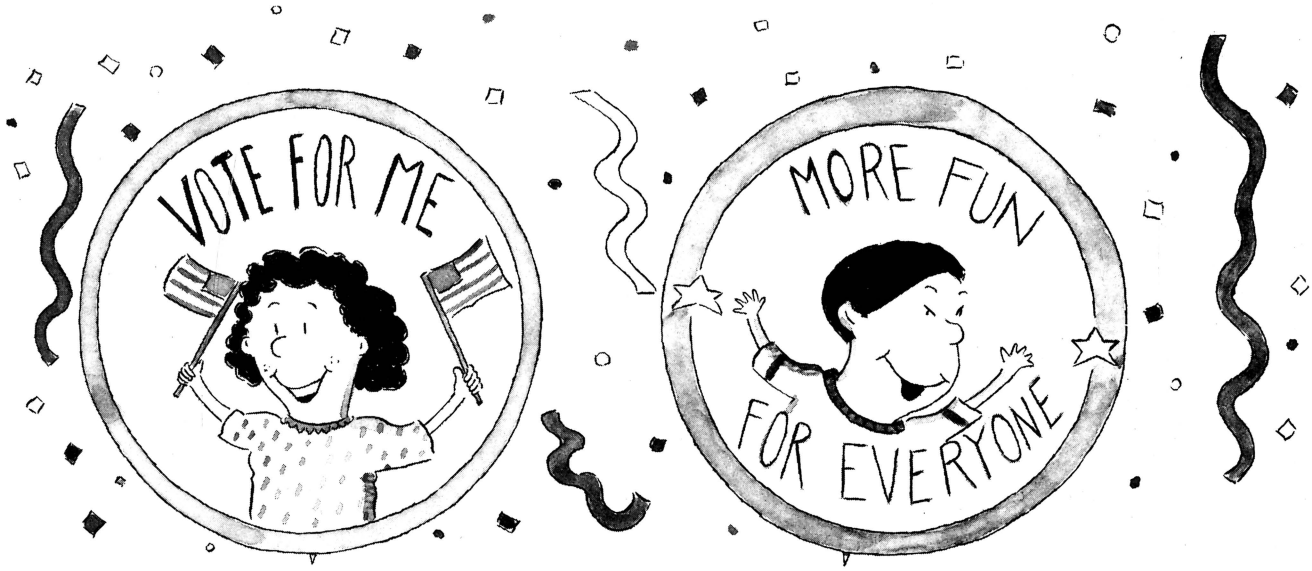
NUMBER 1

WORKSHEET TO USE WITH THIS SUPER PAGE

NAME: _____

If I Were
PRESIDENT

DIRECTIONS: If *you* were elected President, what would be the three most important things you would want to accomplish? List them here.



1. _____

2. _____

3. _____

Using words and pictures — on the computer or off — turn this list into a poster telling the voters what they can expect from you as President.

COPY

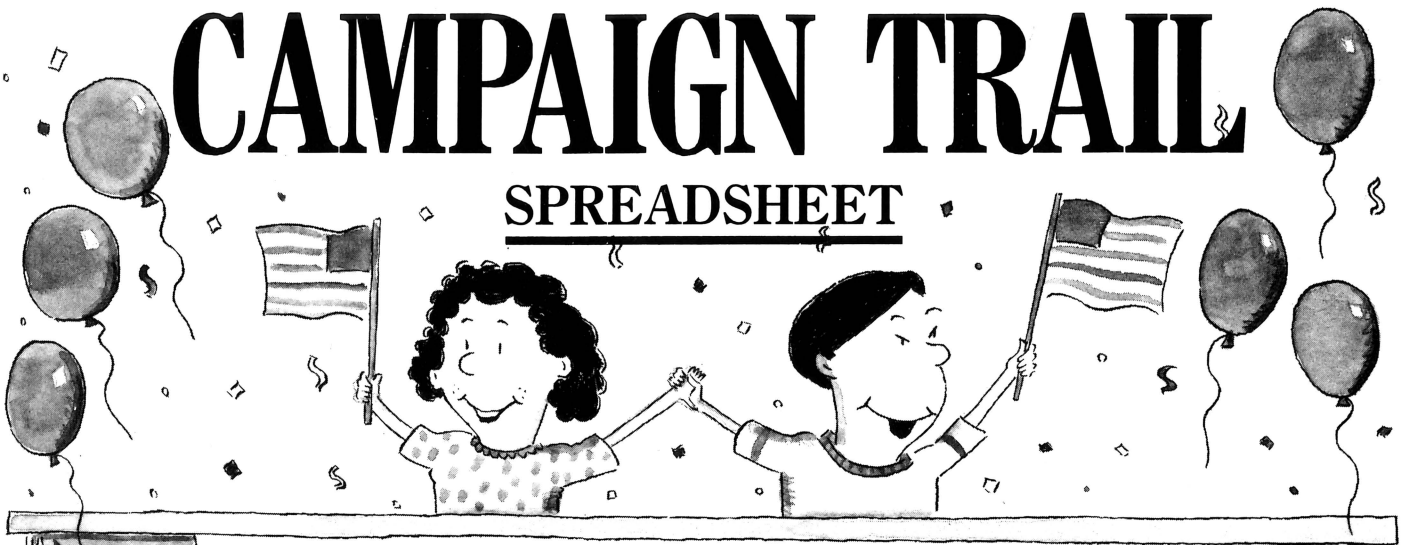
NUMBER 2

WORKSHEET TO USE WITH THIS SUPER PAGE

NAME: _____

CAMPAIGN TRAIL

SPREADSHEET



DIRECTIONS: Running for President isn't just a matter of votes — it's a matter of dollar and cents as well! Pretend that you are a candidate planning a campaign visit to Anytown, U.S.A. Use this sample spreadsheet (on or off the computer) to figure out your budget. Then figure out how much money you need to raise through campaign contributions to cover your expenses.

	A	B	C	D
1		BUDGET		
2	ITEM	PRICE	NUMBER	TOTAL
3	TV Ad	$1,000		
4	Band	200		
5	Poster	5		
6	Button	1		
7			SUBTOTAL	
8				
9		CAMPAIGN CONTRIBUTIONS		
10	TYPE	AMOUNT	NUMBER	TOTAL
11	Small-Fry	$10		
12	Mid-Size	50		
13	Big-Wigs	100		
14			SUBTOTAL	

COPY

NUMBER 3

WORKSHEET TO USE WITH THIS SUPER PAGE

SEND A MESSAGE

DIRECTIONS: What issues are you most concerned about: pollution, drugs, world peace, the local park? Choose one candidate running for local or national office and write him or her a letter about what you think. Get started by filling in this outline for a business letter, then use the word processor to complete your letter.

_____
your name

_____
your address

_____
your city, state, zip code

_____
date

_____
candidate's name

_____
address

_____

_____
city, state, zip code

Dear _____,

(Complete this section on the word processor.)

Sincerely,

_____
your name

NOT INTO BASIC? HOW TO PLAY ANYWAY

Even if BASIC programming is not among your teaching objectives, you can still use the data chart on page 30 and the adventure program below to familiarize your students with the planets in our solar system. Steps ten through six in the Countdown will acquaint you with concepts of cooperative learning theory, give you suggestions on how to introduce the data charts in your classroom, and provide pointers for having the student teams play the prototype STARGAME. You may wish to limit your cooperative learning groups to four students apiece by combining the role of the fact checker and program checker.

Once each group has run the STARGAME adventure program, challenge the children to work with their groups to create original adventure program scenarios. Be sure that the students include at least five solar system quiz questions that can be answered with the help of the data charts. Children should, of course, be able to supply you with an answer to each of these questions as well.

Substitute these questions for the PRINT statements used in the prototype BASIC program. You can either type the new text into the computer yourself, or show the children how to do so.

Help the children RUN their BASIC programs at the computer. Do they remember the correct answers without looking at the charts? Children will enjoy seeing their own ideas, words and questions appear on the computer screen — even if they didn't actually program them in themselves.

PROGRAM LISTING for STARGAME (Apple II series computers)

```
5 K = 0
10  HOME
15  PRINT "HELLO, SPACE TRAVELERS! YOU"
16  PRINT "AND YOUR SPACE CREW ARE RIDING"
20  PRINT "ALONG WHEN SUDDENLY AN ION STORM"
21  PRINT "BEGINS. YOU BETTER GET OUT OF"
25  PRINT "HERE FAST! SINCE YOUR CREW HAS"
26  PRINT "BEEN EXPERIMENTING WITH HYDROGEN GAS,"
30  PRINT "WHY NOT GO TO THE LARGEST PLANET"
31  PRINT "THAT HAS THIS GAS IN ITS ATMOSPHERE."
35  PRINT "WHICH HUGE PLANET WILL YOU VISIT?"
50  INPUT Q1$
55 K = K + 1
60  IF Q1$ = "JUPITER" THEN  GOTO 100
65  HOME
70  PRINT "NO, THAT'S NOT CORRECT. TRY AGAIN."
71  PRINT
75  GOTO 16
100  HOME
105  PRINT "JUPITER IS CORRECT!"
106  PRINT
110  PRINT "NOW THAT YOU'RE SAFE, YOUR CREW"
111  PRINT "DECIDES TO TAKE A CAMERA AND SHOOT"
112  PRINT "SOME COLORFUL PICTURES OF THE MOST"
113  PRINT "TILTED PLANET IN THE SOLAR SYSTEM."
115  PRINT "WHAT COLOR WILL THE SKY APPEAR"
116  PRINT "IN THE PICTURES THAT YOU TAKE?"
120  INPUT Q2$
125 K = K + 1
130  IF Q2$ = "GREEN" THEN  GOTO 200
135  HOME
140  PRINT "NO, TRY ANOTHER COLOR."
141  PRINT
145  GOTO 110
200  HOME
205  PRINT "YES. URANUS, THE PLANET WITH THE"
206  PRINT "GREEN SKY, IS TILTED SO MUCH THAT IT"
210  PRINT "ROLLS ON ITS SIDE AROUND THE SUN!"
211  PRINT
215  PRINT "SO THAT TIME DOESN'T FLY TOO QUICKLY"
216  PRINT "YOUR CREW DECIDES TO VISIT THE PLANET"
220  PRINT "WHERE A DAY IS LONGER THAN A YEAR."
221  PRINT "WHERE ARE YOU GOING TO GO TO"
225  PRINT "FIND SUCH A PLANET?"
230  INPUT Q3$
235 K = K + 1
240  IF Q3$ = "VENUS" THEN  GOTO 300
245  HOME
250  PRINT "NO, BUT IT MIGHT HELP"
251  PRINT "IF YOU THINK ABOUT WHAT"
252  PRINT "A DAY AND A YEAR REALLY MEAN."
253  PRINT
255  GOTO 215
300  HOME
305  PRINT "STRANGE, BUT TRUE! IT TAKES"
306  PRINT "VENUS LONGER TO ROTATE ON ITS"
307  PRINT "AXIS (DAY) THAN TO REVOLVE"
310  PRINT "AROUND THE SUN (YEAR)!"
311  PRINT
315  PRINT "FOURTH, GO TO MARS AND WEIGH"
316  PRINT "YOURSELF. WILL YOU WEIGH MORE"
320  PRINT "OR LESS ON MARS THAN YOU DO"
321  PRINT "ON EARTH?"
325  INPUT Q4$
330 K = K + 1
335  IF Q4$ = "LESS" THEN  GOTO 400
340  HOME
345  PRINT "NOT TRUE. TRY AGAIN."
346  PRINT
350  GOTO 315
400  HOME
405  PRINT "YES, YOU'LL WEIGH ABOUT"
406  PRINT "38 PERCENT AS MUCH ON MARS."
407  PRINT
410  PRINT "IT'S ALMOST TIME TO HEAD HOME NOW TO"
411  PRINT "REFUEL. BEFORE YOU DO, THOUGH, GO TO"
412  PRINT "THE SMALLEST PLANET AND SCOOP UP"
413  PRINT "SOME OF ITS ATMOSPHERE."
415  PRINT "WILL YOU GATHER OXYGEN,"
416  PRINT "HYDROGEN, CARBON DIOXIDE,"
420  PRINT "METHANE, OR AMMONIA GAS?"
425  INPUT Q5$
430 K = K + 1
435  IF Q5$ = "METHANE" THEN  GOTO 500
440  HOME
445  PRINT "THAT'S FUNNY. I'VE NEVER SEEN THAT"
446  PRINT "GAS HERE BEFORE. I THINK YOU BETTER"
447  PRINT "TRY AGAIN."
448  PRINT
450  GOTO 410
500  HOME
505  PRINT "TRUE. SMALL PLUTO HAS A VERY THIN"
506  PRINT "ATMOSPHERE OF METHANE GAS."
507  PRINT
510  PRINT "HOORAY! YOU'VE DONE IT!"
515  PRINT "THE MISSION HAS BEEN A SUCCESS!"
520  PRINT "WHILE IT'S POSSIBLE TO COMPLETE THE"
521  PRINT "TRIP IN AS LITTLE AS 5 MOVES, YOU"
525  PRINT "YOU DID IT IN ";K" MOVES."
530  PRINT "WOULD YOU LIKE TO TRY IT AGAIN?"
535  PRINT "TYPE 'YES' OR 'NO.'"
540  INPUT Q7$
545  IF Q7$ = "YES" THEN  GOTO 5
550  PRINT "O.K. SEE YOU NEXT TIME!"
555  END
```

USING THIS PROJECT WITH SPECIAL NEEDS STUDENTS

Educational computing holds much promise for students with special needs. The computer can serve as "a great equalizer," a tool for overcoming communication and productivity barriers. For students with physical handicaps, adaptive hardware devices are often needed to make the computer fully useful; for students with learning disabilities, adaptations may be equally necessary in the design and management of computer activities. This column, which will appear in conjunction with each *Teaching and Computers* Class Project feature, will guide you in meeting the needs of your learning disabled students.

DEFINITION OF TERMS

Expressive language: Students with expressive language problems have trouble "getting the words out." Often their words and sentences do not make sense in the context of conversation, and they can only show understanding when presented with a multiple choice format or pictures. Verbal group participation may be hard, but these students can participate in other ways.

Short-term memory: Students with memory problems may appear not to have listened or concentrated because they can only retain information for a short period of time. When trying to locate information on a chart, they may forget what they are looking for as they scan. Color-coding and other cues help.

Visual discrimination: Students with visual discrimination problems tend to confuse or reverse their numbers and letters (for example, they read "g" for "9," "b" for "d"). On a computer, the size and clarity of the print can be very important.

Visual figure ground: Students with figure ground difficulties often lose their place on the page. They tend to have trouble on the computer when the screen is too cluttered or the print is too small.

Abstract reasoning: Students with difficulty in this area have trouble drawing conclusions and relating pieces of information. Listing steps, highlighting related information, and linking new material to previously learned skills all help.

BY NANCY BLEY

ADAPTIVE STRATEGIES

Tailor the cooperative learning groups: Although cooperative learning can work well for learning disabled students, it can also be a source of difficulty. For example, although a child may be "a good reader," expressive language difficulties may make it hard for him or her to point out, as a fact checker, whether something has been incorrectly stated. One adaptive strategy may be to discuss with the class, prior to making group assignments, what is required in the various roles. Write the roles on the chalkboard and have each student choose two that he or she would feel comfortable with. After looking at the students' choices to make sure that their chosen roles are appropriate (or at least adaptable), arrange the class into cooperative learning groups based on these choices. Within each group, be sure students know what everyone's preferences are and then let the students choose their final roles.

Preview vocabulary: Students with learning disabilities (and those without!) may have trouble with many of the science and computer terms in this Class Project. As far in advance as possible, make a list of all the potentially difficult words and have students read through the list aloud. Provide "overlearning" by placing any unfamiliar words in spelling, vocabulary, and grammar lessons. Have students write the words on flash cards, draw pictures or other clues on the back of the cards, and then alphabetize them. When students come across the words in the actual project, the flash cards may help jog their memories.

Point out patterns: Learning disabled students frequently have difficulty hearing and seeing patterns. When asking these students to notice patterns in the BASIC program listing and printout, it may help to start them out by highlighting a section — for example, all of the blocks beginning with PRINT. This will give students a starting point to look for other patterns.

Add double-spacing: Students with visual discrimination or visual figure ground problems may need to have the program listing on the screen and/or printout double-spaced. To do this, simply insert an additional line number and the command PRINT after each line in the program, then press RETURN.

Prevent line breaks: All students, including those with learning disabilities, find it difficult to read BASIC program print statements that contain awkward breaks in words. The allowable line length varies from machine to machine, but the maximum range is generally 37-40 characters after the command PRINT. Assist your student teams in making sure that their program "scripts" read well on the screen, adding additional PRINT statement lines if necessary.

Help with questions: Students with expressive langauge difficulties often find it very hard to form a question. In step 7, you might assist these students by providing them with fill-in-the-blank cards for forming and answering questions — for example, "Which _____(planet) has a _____(surface) made of _____(metallic and liquid hydrogen)." Highlight the data chart and the corresponding blank lines on the question cards in the same color. Prepare these cards ahead of time and either practice with students prior to launching the Class Project or allow them to use the cards during the project, whichever seems most comfortable.

Break program into segments: It may help students with abstract reasoning difficulties, short-term memory problems, or visual figure ground problems to break down the prototype BASIC program into 10- to 20-line segments, with each segment pasted or written on a 5" X 8" notecard. Then, as student write their own programs, they can match their lines by cards and sequence the cards before final typing.

Nancy Bley is academic coordinator at the Park Century School in Los Angeles, CA.

Editor's note: T&C *welcomes suggestions from all teachers of special needs students regarding strategies for computer use.*

EDITING MOTHER GOOSE

Curriculum Objective:
Recognizing and correcting text errors
Computer Skill:
Editing with a word processor

The word processor, with the ease that it brings to revising text, has allowed us to create a new and different environment for the writing process. The following task card activities will provide students with experience in identifying "bloopers" in familiar rhymes from Mother Goose, and using the word processor's DELETE, INSERT, COPY, and MOVE functions to correct them.

Materials Needed: The activities require a word processing program, prepared data disks (see below), optional handouts, and a printer. Have on hand crayons or colored markers for students to illustrate their printed rhymes.

Preparation: Using your word processor, type in the text files as shown on this page and save them on a data disk. Depending on the age and ability level of your students, you may want to create the optional "real rhyme" handouts shown on page 44 to help them with the task cards. Finally, cut out and laminate the task cards which appear on pages 44 and 45. If necessary, review with your students the procedures for loading and printing text files, as well as using the DELETE, INSERT, COPY, and MOVE functions of your word processor.

Discussion: Before assigning the task cards to your students, read together as a class several Mother Goose rhymes other than those included in this lesson plan. Help your students to identify *rhyme* and *rhythm* in these poems, and review with them such concepts as *adjectives, sequencing,* and *context.*

Activity: Have students take turns working through the four tasks cards. When they have completed each card, students should illustrate their printout with crayons or colored markers. At the end of the unit, choose one illustrated rhyme from each student to display on a Mother Goose bulletin board.

Kathy Kreifels
Springfield Elementary School
Springfield, NE

TEXT FILES

Type in and save these files under the given file names on your class data disk.

STRAIGHT *(for Task Card #1)*

THERE WAS A STRAIGHT MAN

There was a straight man,
  And he went a straight mile,
He found a straight sixpence
  Against a straight stile;
He bought a crooked cat
  Which caught a straight mouse,
And they all lived together
  In a straight little house.

PIGS *(for Task Card #2)*

THIS PIG WENT TO MARKET

This pig went to market,
That pig stayed at home;
This pig went to the movies,
This pig had roast meat,
This pig had frozen waffles,
This pig had none;
He was on a diet.
This pig went to the barn door,
And cried "week, week," for more.

MOTHER *(for Task Card #3)*

OLD MOTHER GOOSE

Old Mother Goose, when
  She wanted to wander,
Would ride through the air
  On a very fine gander

She sent him to market,
  A live goose he bought:
"Here! mother," says he,
  "It will not go for nought."

Mother Goose had a house,
  'Twas built in a wood
An owl at the door
  For a porter stood

Jack found one morning,
  As I have been told,
His goose had laid him
  An egg of pure gold.

Jack's goose and her gander
  Grew very fond;
They'd both eat together,
Or swim in one pond.

And Old Mother Goose
  The goose saddled soon,
And mounting its back,
  Flew up to the moon.

Jack rode to his mother,
  The news for to tell.
She called him a good boy,
  And said it was well.

She had a son Jack,
  A plain-looking lad
He was not very good,
  Nor yet very bad.

MUFFET *(for Task Card #4)*

LITTLE MISS MUFFET

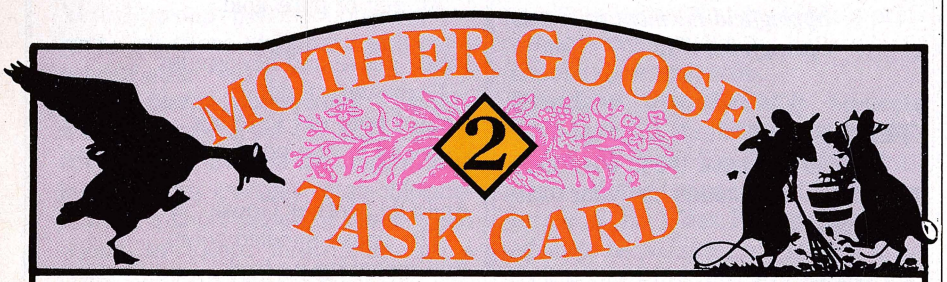
Little Miss Muffet
  Sat on a tuffet,
Eating some curds and whey;
  There came a great spider,
And sat down beside her,
  And frightened Miss Muffet away.

(continued)

Boot up your word processing program, and load the STRAIGHT file from the data disk.

Read the rhyme. There is something wrong. Someone has changed all of the *adjectives* (describing words) to "straight," which is the opposite of the adjective that should be there! Only the cat has the right adjective. Find the cat's adjective, and REPLACE every "straight" with that word.

Type your name at the top of the page, and print out the corrected rhyme.



Boot up your word processing program, and load the PIG file from the data disk.

Read the rhyme. The rhyme is supposed to be about five little pigs, but there are some extra lines here that don't fit. Can you find them? (Your teacher may give you a copy of the real rhyme to help you.) DELETE the extra lines.

Type your name at the top of the page, and print out the corrected rhyme.

ELECTRONIC LESSON PLANS

OPTIONAL HANDOUTS

To help students with Task Cards #2 and #3, you may want to type up these correct versions of the Mother Goose rhymes which appear in the data files.

THIS PIG WENT TO MARKET *(for Task Card #2)*

This pig went to market,
That pig stayed at home;
This pig had roast meat,
This pig had none;
This pig went to the barn door,
And cried "week, week," for more.

OLD MOTHER GOOSE *(for Task Card #3)*

Old Mother Goose, when
  She wanted to wander,
Would ride through the air
  On a very fine gander

Mother Goose had a house,
  'Twas built in a wood
An owl at the door
  For a porter stood

She had a son Jack,
  A plain-looking lad
He was not very good,
  Nor yet very bad.

She sent him to market,
  A live goose he bought:
"Here! mother," says he,
  "It will not go for nought."

Jack's goose and her gander
  Grew very fond;
They'd both eat together,
Or swim in one pond.

Jack found one morning,
  As I have been told,
His goose had laid him
  An egg of pure gold.

Jack rode to his mother,
  The news for to tell.
She called him a good boy,
  And said it was well.

And Old Mother Goose
  The goose saddled soon,
And mounting its back,
  Flew up to the moon.

Boot up your word processing program, and load the MOTHER file from the data disk.

Mother Goose is all mixed up! The verses of the rhyme are out of order. Can you figure out the right order for Mother Goose? (Your teacher may give you a copy of the real rhyme to help you.) MOVE the verses of the rhyme into the correct order.

Type your name at the top of the page, and print out the corrected poem.

Boot up your word processing program, and load the MUFFET file from the data disk.

What is a "tuffet"? Have you ever eaten "curds and whey"?

This poem full of old-fashioned words that are hard to understand. It's your job to bring the rhyme up-to-date! Change "tuffet" to something that a person would sit on. Change "curds and whey" to something that a person would eat today. Then change any other words you need to change so that the poem still has rhyme and rhythm!

When you have something that Mother Goose would be proud of, type your name at the top of the page and print out your work.

ELECTRONIC LESSON PLANS

Halloween Specials

CRITTER VERSE

Challenge kids use a data base program to set up files on Halloween-type animals such as the great horned owl, vampire bat, timber wolf, tarantula spider, and burmese cat. Fields for each animal could include name, appearance, food, habitat, and creepy talents. Children can then select an animal record from their files and use the data to write a Halloween poem.

—Mary Dalheim

MONSTROUS MAIL

Challenge your students to use a program such as *SuperPrint* (Scholastic) or *The Print Shop* (Broderbund) to design letterheads for their favorite monsters. Kids will need to dream up a complete mailing address for each monster (how about "10 Neckbite Lane, Fangville, Transylvania" for Dracula?) and then select appropriate graphics. Once the letterhead is complete, have students write an imaginary letter from a monster reporting on his/her/its Halloween plans!

— Mickey Revenaugh

SOFTWARE SCARE

Give basic skills a boo-st during Halloween week by placing software programs like these in your computer center:

1. *Ghost Hunt* (Mindscape): Students develop map reading skills as they move through four towns in search of ghosts. Grades 2–4.
2. *Grammar Gremlins* (Davidson): Players practice grammar rules this haunted house game. Grades 3–6.
3. *The Incredible Laboratory* (Sunburst): Children "mix" chemicals to produce various monsters — and exercise problem solving skills. Grades 3 and up.

— Mary Dalheim

SOCIAL STUDIES

NAME THAT STATE!

Curriculum Objective:
Learning about electoral votes and the states
Computer Skill:
Creating and using a data file

In a Presidential election year, what more exciting and timely way could there be to reinforce information about the states than a quiz-show game in which players score electoral votes? In this data base activity, the competition will be as stimulating as this year's election.

Materials Needed: You'll need a simple data base management program with which your students are familiar. In addition, have on hand several reference resources with information about the states. Encyclopedias and almanacs are good, as are automobile club tour books. The Chamber of Commerce in each state is also a good source of information.

Preparation: Using the data base program, set up a data file consisting of some or all of the following categories, depending on your students' resources and ability level.

STATE DATA RECORD

BIRD:
FLOWER:
NICKNAME:
YEAR OF STATEHOOD:
CAPITAL:
PRODUCTS:
ATTRACTIONS:
TRIVIA:
FAMOUS FOODS:
MAJOR CITIES:
POPULATION:

Print out a blank data record and make 60 photocopies (one for each state and the District of Columbia, plus a few extras for practice).

Next, use your word processing program or a printing program such as *SuperPrint* (Scholastic) to set up a "Clue Sheet" form with the following information.

CLUE SHEET
CATEGORY:
ANSWER:
QUESTION:
NAME THAT STATE!:

Make at least 60 copies of the blank Clue Sheet.

Discussion: Explain to your students that they are going to play a game patterned after the television game, "Jeopardy," to see how much they know about each of the United States and the District of Columbia. Instead of scoring points, though, they will score electoral votes.

Ask students if they know what an electoral vote is. Do they know about the Electoral College and what it is? Explain that it is not a place, but a group of people from each state who are called "electors." Their job is to elect the President and Vice President by voting for the nominees of their party's choice, based on the number of votes cast by ordinary citizens (known as the *popular vote*).

Each state has a given number of electoral votes, equal to the number of its members in the House of Representatives (based on population) plus the number of its Senators (two for each state). No state has less than three electoral votes. A majority of all available electoral votes (270) is needed to elect a President and Vice President.

Activity: Divide your class into two teams, Team A and Team B, and assign each team its list of states shown on page 47. (You'll notice that each list adds up to the same number of electoral votes — 269.) Pass out half of the blank data records to each team, and explain that Team A will set up a data file to challenge Team B, while Team B sets up a data file to challenge Team A. Have the members of each team divide up its list of states to research and fill in a pencil and paper record about each state. Point out that the data record does not include a space for the state name, so that students can keep their states secret once the game begins.

When all team members have completed their paper data records, have students exchange records within their teams for proofreading and fact checking. Then have students take turns entering their secret state data into the computer data base.

Activity: Next, provide each team with half of the blank clue sheets so that its members can write one "Jeopardy" challenge about each state they researched (see sample clues, page 47). For each clue sheet, students should choose from among the data fields they filled out for the state data records (BIRD, CAPITAL, NICKNAME, and so on) as a "Category." As a clue under that Category, students will provide an "Answer" for which the opposing team must search the data base to fill in a "Question" before guessing the state. For example, under the Category of "Flower," Student A may write as an Answer, "The tallest cactus." When Student B from the opposing team chooses that clue, he or she might sort all of the data records by flower and scan the list for a likely prospect, or do some quick research on cactus in order to search the FLOWER fields for a specific name. Either way, Student B should write in on the Question line of the clue form, "What is a saguaro?" And by looking through the rest of the data in the record on which the saguaro appears, Student B should be able to fill in the "Name That State!" line correctly as "Arizona." Caution students

not to make their answer clues too easy or too hard.

Activity: When each team has created all of its state clue forms, your students are ready to play Name That State! Have the teams flip a coin to determine which will play first. If Team A wins the toss, a representative of Team A will choose one category, and Team B will supply him or her with a clue form for that category. Team A will reconvene to brainstorm strategies for extracting the needed information from the data base. At the end of a specified time period — say, 10 minutes — Team A must complete the clue form and report its guesses to Team B. If the guesses are correct, Team A wins that state's electoral votes, and can choose another category to continue playing. If the guess is incorrect, Team B will get its chance to play contestant.

When one of the teams correctly completes all of its opponent's clue forms and reaches a total of 269 electoral votes, assign one of the "Majority-Maker" challenges about the Presidents and their home states at right. A correct answer adds that state's electoral votes to the team's total and wins the game — just as 270 electoral votes wins the election!

Activity: If time allows, have each team create a second set of clue forms for its states, and play Name That State again!

Leah Roth and Ilene Roth
New York, NY

TEAMS, STATES, AND ELECTORAL VOTES

Team A
Alaska 3
North Dakota 3
Vermont 3
Washington, D.C. 3
Maine 4
Nevada 4
Rhode Island 4
Utah 5
West Virginia 6
Arizona 7
Kansas 7
Oregon 7
Colorado 8
Connecticut 8
Alabama 9
Maryland 10
Washington 10
Missouri 11
Georgia 12
Indiana 12
North Carolina 13
New Jersey 16
Michigan 20
Ohio 23
Pennsylvania 25
New York 36

Team B
Delaware 3
South Dakota 3
Wyoming 3
Hawaii 4
Idaho 4
New Hampshire 4
Montana 4
New Mexico 5
Nebraska 5
Arkansas 6
Mississippi 7
Iowa 8
Oklahoma 8
South Carolina 8
Kentucky 9
Louisiana 10
Minnesota 10
Wisconsin 11
Tennessee 11
Virginia 12
Massachusetts 13
Florida 21
Illinois 24
Texas 29
California 47

SAMPLE CLUES AND GUESSES

CATEGORY: Attractions
ANSWER: A skyscraper named for the state.
QUESTION: What is the Empire State Building?
NAME THAT STATE!: New York

CATEGORY: Year of Statehood
ANSWER: The twentieth century minus 10.
QUESTION: What is 1890?
NAME THAT STATE!: Oklahoma

CATEGORY: Capital
ANSWER: A mile-high city.
QUESTION: ANSWER: What is Denver
NAME THAT STATE!: Colorado

CATEGORY: Bird
ANSWER: A bird named after a desert plant.
QUESTION: What is the Cactus Wren?
NAME THAT STATE!: Arizona

CATEGORY: Nicknames
ANSWER: It means both "Hello" and "Goodbye."
QUESTION: ANSWER: What is "Aloha"?
NAME THAT STATE!: Hawaii

CATEGORY: Products
ANSWER: Fruits named for their color.
QUESTION: What are oranges?
NAME THAT STATE!: Florida

MAJORITY-MAKER CHALLENGES

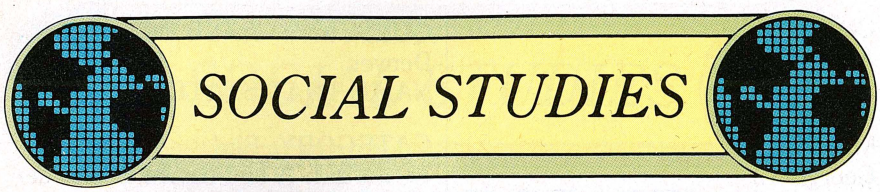
CLUE: This President came from the "Show Me" state.
NAME THAT STATE!:
Missouri
NAME THAT PRESIDENT!:
Harry Truman

CLUE: This president's state is famous for the Alamo.
NAME THAT STATE!: Texas
NAME THAT PRESIDENT!:
Lyndon B. Johnson

CLUE: This president's state is famous for its peanuts.
NAME THAT STATE!: Georgia
NAME THAT PRESIDENT!:
Jimmy Carter

CLUE: This president's state has a presidential candidate running in this year's election.
NAME THAT STATE!: Massachusetts
NAME THAT PRESIDENT!:
John F. Kennedy

CLUE: This tall president's state is the home of the tallest building in the United States.
NAME THAT STATE!: Illinois
NAME THAT PRESIDENT!:
Abraham Lincoln



NEW WORLD EXPLORERS

Curriculum Objective:
Learning about New World explorers
Computer Skill:
Using LogoWriter *text and graphics*

Every school child knows the rhyme: "In fourteen hundred ninety two, Columbus sailed the ocean blue." But was Columbus *really* the first European to "discover" America? Who were some of the other New World explorers? With this lesson plan, history will come alive as your students develop a *LogoWriter* timeline of New World exploration.

Materials: Assemble a variety of reference books and materials on New World explorers. You'll also need *LogoWriter* and at least one data disk containing the procedures listed on below. Finally, you'll need a copy of the "Explorers" and "*LogoWriter* Instructions" mini-worksheets (page 49) for each of your students.

Preparation: Using *LogoWriter*, create a file called EXPLORERS. (If your students are familiar with *LogoWriter*, you may want to have the children type the procedures in themselves.) Save the procedures below on the flip side of your EXPLORERS file. (Type OPEN APPLE-F to get to the flip side of the page.)

```
TO START
  PU
  SETPOS [-130 -65]
  PD
END

TO BIGMARK
  FD 30 BK 30
END

TO SMALLMARK
  FD 15 BK 15
END

TO TIMELINE
  RG
  CT
  START
  SETC 4
  BIGMARK
  SETC 5
  RT 90
  FD 50
  REPEAT 4 [LT 90 SMALLMARK RT 90
FD 50]
  LT 90
END
```

Copy the list of explorers shown below onto your chalkboard.

NEW WORLD EXPLORERS

Vasco Nunez de BALBOA
BERING
John CABOT
Jacques CARTIER
Samuel de CHAMPLAIN
Christopher COLUMBUS
James COOK
Francisco de CORONADO
Gaspar CORTE REAL
Hernando CORTES
Ponce DE LEON
Hernando DE SOTO
Sir Francis DRAKE
Leif ERICSSON
ESTEVANICO
Martin FROBISHER
Henry HUDSON
LA SALLE
Amerigo VESPUCCI

Discussion: Although he is often credited with "discovering" America, tell students, Christopher Columbus was neither the first nor the only European explorer to reach the New World. The Vikings preceded him by five centuries, and even the name "America" came from another explorer, Amerigo Vespucci. You might also point out that the real discoverers of America were the Indian tribes who already inhabited the new land long before the arrival of Europeans.

Tell students that they will now research the European explorers and place them in proper chronological order.

Activity: Have each student or pair of students select one explorer to research. Distribute the "Explorers" mini-worksheet for students to fill out.

Activity: When the research is complete, have each student or pair of students enter the information from the worksheet onto the *LogoWriter* timeline page, following the instructions on Mini-Worksheet #2 (page 49).

Activity: Have students take turns printing out their section of the timeline by calling up their page on the monitor and then typing the command PRINTSCREEN. (For variety, you might try using different colored paper or printer ribbons for different explorers.) With timeline pages in hand, have students circulate until they match their page with the ones just prior to and immediately following it. Once students have arranged their pages in chronological sequence, tape the pages to a piece of colored butcher paper to hang above the chalkboard.

Extension Activities: Students with some knowledge of Logo programming might want to create procedures to draw a small flag next to their explorer's name, representing his country of origin. Advanced students might wish to create *LogoWriter* shapes that will "carry" the flag to the approprate place on the timeline and "plant" it.

Dee Miller
St. James Day School
Texarkana, TX

Mini-Worksheet 1
EXPLORERS WORKSHEET

DRAW A DOTTED LINE ON THE MAP TO SHOW THE AREA EXPLORED. IN THE BOX, DRAW A FLAG OF THE COUNTRY FOR WHICH THE LAND WAS CLAIMED.

EXPLORER	
COUNTRY OF ORIGIN	
AREA EXPLORED	
DATE	
OTHER DETAILS	

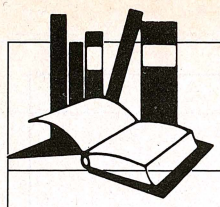
Mini-Worksheet 2
LOGOWRITER INSTRUCTIONS

Labeling the Timeline

1. Load *LogoWriter* into the computer, then load the data disk and choose the page called EXPLORERS.
2. When the page appears, type the word TIMELINE to draw the line on the screen.
3. Press OPEN APPLE-9 and move the turtle with the arrow keys until it is under the big mark. Press ESC to move the cursor back to the command center.
4. Use the command LABEL and an opening quotation mark to indicate the year of the discovery on the timeline (Example: LABEL "1492).

Adding Details

1. Press OPEN APPLE-U to move the cursor to the top of the screen. *LogoWriter* will now work as a word processor.
2. Use the TAB key to center the explorer's name at the top of the page.
3. Press RETURN to skip lines, DELETE to backspace and erase, and the SPACE BAR to move text to the right.
4. Type all important facts and details from your worksheet onto the screen.
5. To move cursor back to the command center, press OPEN APPLE-D.



LOOK IT UP!

TASK CARDS THAT TEACH REFERENCE SKILLS

Encyclopedia Extravaganza

Do you remember, as a student, rushing to the encyclopedia for some last minute research before a major term paper was due? Your students are likely to be in the same position one day — but instead of flipping through volumes on a bookshelf, they may use a computer with a compact disk drive or modem instead.

Look It Up! is a six-part series of task cards that help students develop the reference skills needed in an information-intensive society. This month, students will key word search, cross-reference, fact check, skim and scan articles, using an encyclopedia.

KEY WORDS AND GUIDE WORDS

An encyclopedia is, traditionally, an alphabetically arranged book, or set of books, consisting of articles about factual topics. With the help of a computer, two less traditional encyclopedias are also available for home, school, or library use. An "on-line" encyclopedia is accessed with a modem and a telephone line; an encyclopedia on a compact disk requires a special CD drive. Both are often updated and are more current than most volumes lining your library shelves.

Finding information in an encyclopedia is as easy as deciding on what *key word* to look up (in a printed volume) or search for (electronically). A key word is the word or words under which you'll find the information that you seek. The key word *animal*, for example, may serve you well if you are looking for information about the animal kingdom. It is all too vague, though, if what you really want are some facts about the chimpanzee. Deciding on the best key word to begin with when researching a topic takes a little practice. Most students, however, quickly pick up the skill.

Just as with the dictionary (see "Look It Up!" in *Teaching and Computers,* September 1988), printed encyclopedias use guide words on each page to indicate the alphabetical placement of its key words. Be careful, though! Some encyclopedias place the guide words at the bottom of the page. Electronic encyclopedias may or may not be arranged alphabetically. They do, however, require the same key word search and cross-referencing skills that are needed when using a bound encyclopedia as a reference book.

THE CROSS-REFERENCE CONNECTION

Using an encyclopedia, have a child look up the name *Clemens, Samuel.* (When looking up a name in a reference source, remind students, last names always come first.) Does the notation that follows read: "See *Twain, Mark*"? Since the person is the same, it is not necessary to have the information listed under both key words, explain to students. The cross-reference "See *Twain, Mark*" is used instead.

Now, using an encyclopedia, have a student look up the key word *llama.* After information on the llama is given, cross-references may again be found. This time the cross-references may be to the words *camel* and *alpaca,* perhaps. Since all are members of the same animal family, helpful information about the llama is probably contained in the articles listed under these key words as well.

Cross-references are easily found when they appear at the end of an article, show students. Some encyclopedias, however, choose to cross-reference within the actual text — indicating helpful key words with bold, capitalized, or italicized letters. In any case, the cross-referencing process is the same.

SKIMMING, SCANNING, AND READING

Finding the appropriate article or articles for a research paper is only half the research battle. To "win the war," the actual research still needs to be done. Should a student read every article related to his or her topic from start to finish — especially if each one is several pages long? Or, are his or her questions specific enough to answer by casting an eye quickly over the page?

If what a student needs is an overview of a topic, or if the child does not know exactly what information he or she is seeking — advise the student to start reading! If, on the other hand, the child needs to know how many humps a llama has (none!), or what its diet consists of, reading the entire article is probably not the best use of the researcher's time.

Skimming is a skill used to look over a page quickly; scanning is what you do when you look at an article in sections, as by its subheads. Along with careful reading, these are especially helpful skills when a deadline nears!

PUTTING IT ALL TOGETHER: ENCYCLOPEDIA RESEARCH TECHNIQUES

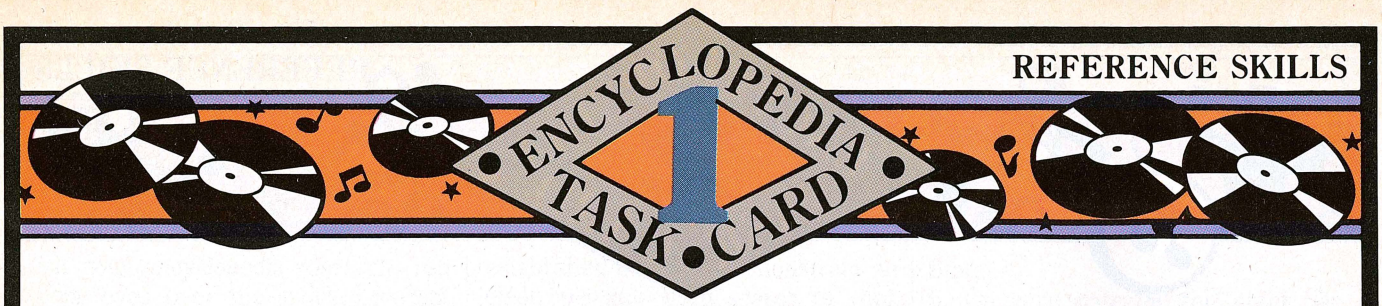
Key word searching, cross-referencing, skimming and scanning — how can students make the best use of these skills? Here are some steps for students to follow when beginning any research project with the encyclopedia:

1. Know your key words. Even before going to the encyclopedia, think of at least three key words that might help you explore your research topic. (If you are researching *tadpoles,* for example, other key words might include *frog* and *toad.*) If your first key word search proves unsuccessful, you still have at least two other key word options to try.

2. Write down questions. Make a list of questions that you want to have answered during the course of your library research. As you find answers to these, new questions will come to mind. Add these to your list. Also, make note of cross-references suggested in the articles you look up.

3. Summarize. Once you've found the information you've been looking for, write down exactly what you need. Be careful not to copy from the encyclopedia word-for-word, though — unless you make it a point to quote the reference source.

4. Skim and scan. Before you fin-



Key Word Kontest

This morning, on opening your box of Delicious Disks cereal, you found a contest entry form.

"Answer the Key Word Kontest questions below," it read, "and you can win a brand new record collection."

All the answers, the instructions explained, can be found in the encyclopedia. But you have to know where to look. Can you do it? The entry date is drawing near!

1. Using your word processing program, load the KEYWORD data file into the computer.
2. Read the questions in the data file. These are the questions to answer in order to win the contest — and the record collection!
3. Next to each question, type in the encyclopedia key word(s) under which you'll find the answers.
4. Save your file on your own data disk. Then make a printout of the file.
5. Using a set of encyclopedias, find the answer to each question. Write the answers on your printout, next to the key word(s) that you used to look them up.
6. Check your answers with your teacher . . . and good luck winning the Delicious Disks Key Word Kontest! (We were only kidding about the record collection!)

Musical Notes

Complete Task Card 2 before you try the activities on this card.

After writing a research report about the rock group The Beatles, Belinda decided to start her own rock band. You've been chosen to be a member! First, though, you need to select an instrument to play.

1. Read the article about musical instruments in your encyclopedia. Decide which instrument you'd like to play.
2. On a sheet of paper take notes about the "family" that your instrument belongs to. What characteristics are common to instruments in this group? What other instruments belong to this instrument family?
3. Find the encyclopedia article about the instrument that you have selected. On your sheet of paper, take notes about how your instrument looks, its history, and any unusual facts about it that you can find.
4. Load your word processing program into the computer, then load the data disk and call up the MUSIC data file.
5. Complete the story on the computer screen by deleting the words in capital letters. Replace these with your research information.
6. Print your document, or save your work under a new file name.

BARRY ZAID

Belinda's Bluff

Complete Task Card 1 before you try the activities on this card.

Belinda is the smartest kid in Mr. Lincoln's class — and the most creative! She's picked a great topic for her research report. The report is due tomorrow, however, and Belinda hasn't quite finished the research. You don't think Mr. Lincoln would notice a few "creative facts" in the report, do you?

Pretend that you are Belinda. At the last minute, your conscience bothers you. You decide to go back and correct your report — and save creativity for other things!

1. Load your word processing program into the computer, then load the data disk and call up the BLUFF data file.
2. Read the report in the data file. Make a printout of the report.
3. Which volume of the encyclopedia will you use to research this topic further? Find the encyclopedia article you need.
4. Find the five errors in Belinda's research report. Make the corrections on your computer printout.
5. Go back to the BLUFF data file. Correct Belinda's bluffs in the file.
6. Print this document, or save your work on your own data disk. Then check your answers with your teacher.

Habitat Happiness

Complete Task Card 3 before you try the activities on this card.

Have you ever heard of a newt in New York, a hippo in Houston, or a tiger in Toledo? An animal's natural environment is called its *habitat.* In a zoo these habitats are copied to keep the animals feeling fine. (There's nothing worse than a perspiring penguin or a too-cool mule!)

You are now an honorary zookeeper — and it's time to check out the animals' living conditions. First, though, you need to know what habitats they like best.

1. Using an encyclopedia, research the habitats of any three zoo animals. Take notes that will help you answer these questions about each one:
   a. What country is this animal from?
   b. What climate and terrain does it like best?
   c. What does the animal like to eat?
   d. In the wild, where does it live?
2. Using a word processing program, load the HABITAT data file into your computer.
3. Insert the information about one of the animals that you researched into the form. Save the file under the animal's name.
4. Follow Steps 2 and 3 to save information about the other two animals that you researched . . . and remember to keep those cage doors shut!

ish your encyclopedia research, run your eyes over the article one last time, looking for factual tidbits that can add "zing" to your report!

PREPARATION

1. Have several sets of encyclopedias available to students working on the task cards. They will also need access to a printer.
2. Cut out and laminate the task cards on pages 51 and 52.
3. Use a word processing program to create the text files on this page. Save the files on a disk under the file names given.
4. Be sure your students know how to INSERT, DELETE, COPY, and MOVE text using your word processing program. They must also know how to retrieve and save documents on a data disk.

PRE-TASK CARD ACTIVITIES

- Assign pairs of students to a particular volume from a set of encyclopedias. Have the children skim through their assigned volume for a topic that they'd like to know more about. After reading the article about the topic, have the children look up that same entry word in another set of encyclopedias. How do the two entries compare? Which is longer? Are the same cross-references given? What generalizations can students make about the two encyclopedias, based on their comparison?
- Divide your class into groups of no more than five students each. Assign each group a general topic, such as "architecture," "literature," or "science." How many specific key words can each group list under which they'll find more information on their topic? Did each group include names of specific people, places, and events?

POST-TASK CARD ACTIVITIES

- Have students locate their encyclopedia's index. After familiarizing the children with the parts of the index, have them discuss ways that it might help them to do a key word search.
- Using a data base program and an established data file, demonstrate an electronic key word search to your students. Point out that one benefit of electronic researching is that combinations of key words can often be requested at the same time. On the other hand, if one were looking for on-line information about George Washington and only typed the key word *Washington*, what do the children think that they would get? *(Students would be lead to an overwhelming number of articles — about George Washington; Washington, D.C.; Washington State; and Booker T. Washington, to name a few!)*
- If you have access to a modem and an information service such as CompuServe, GEnie, or The Source, select a topic and go on-line to show students how a real electronic data search is done. Be sure to decide on the topic in advance, and determine if multiple key words are required. Most information services charge more the longer you stay on-line.

TASK CARD ANSWERS

Task Card 1: *1. Washington, George; 2. Alaska; 3. Columbus, Christopher; 4. Mississippi River; 5. Reagan, Ronald; 6. San Francisco; 7. Kansas; 8. Nebraska and Oregon.*
Task Card 2: The Beatles were from *Liverpool*, England. John Lennon was born in *1940*. George's last name is *Harrison*. Starr's first name is *Ringo*. Starr is a *drummer*.
Task Cards 3 and 4: Answers will vary.

Thomas E. Boudrot, author of *Byte-Sized Activities: the Generic Word Processing Book*, is a computer instruction consultant for the Katy Independent School District in Katy, TX.

THE TEXT FILES

KEYWORD

1. Did George Washington really wear false teeth?
2. How large is the state of Alaska?
3. Where was Christopher Columbus born?
4. How long is the Mississippi River?
5. In what year did Ronald Reagan become 40th president of the United States?
6. On what date did the great San Francisco earthquake take place?
7. What is the capital of Kansas?
8. Which state was admitted into the Union first: Nebraska or Oregon? (This one is tricky!)

BLUFF

Four musicians rocked the world during the 1960s. They called themselves The Beatles. They came from London, England, but became world famous overnight.

John Lennon, born in 1925, was the leader of the Beatles. He played guitar and sang. Two other guitar players were Paul McCartney (born in 1942) and George Harrington (born in 1943). Wrongo Starr, the violinist, was a favorite of many Beatles' fans. His real name was Richard Starkey.

The Beatles split up in 1970, but by that time they had already sold more records than any other popular group.

MUSIC

Hey, music fans! My name is NAME and I'm a member of Belinda's Band. My instrument is the INSTRUMENT. It's part of the INSTRUMENT FAMILY family of instruments.

As a INSTRUMENT FAMILY instrument, my instrument is INSTRUMENT FAMILY CHARACTERISTICS. Other instruments in the INSTRUMENT FAMILY family include the INSTRUMENT NAMES.

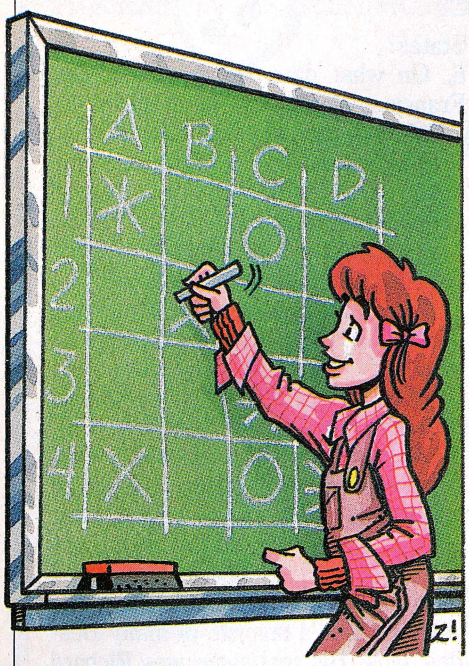
Have you ever seen a INSTRUMENT before? It is DESCRIPTION OF INSTRUMENT. It was invented in DATE. You may not know this, but the INSTRUMENT — INTERESTING FACTS. It also MORE INTERESTING FACTS.

HABITAT

ANIMAL NAME:
WHAT COUNTRY IT IS FROM ORIGINALLY:
THE CLIMATE IT LIKES BEST:
THE SURROUNDINGS IT LIKES TO LIVE IN:
THE FOODS IT EATS:
OTHER HELPFUL FACTS: ■

MICRO IDEAS

QUICK COMPUTER TIPS AND ACTIVITIES



SPREADSHEET TIC-TAC-TOE

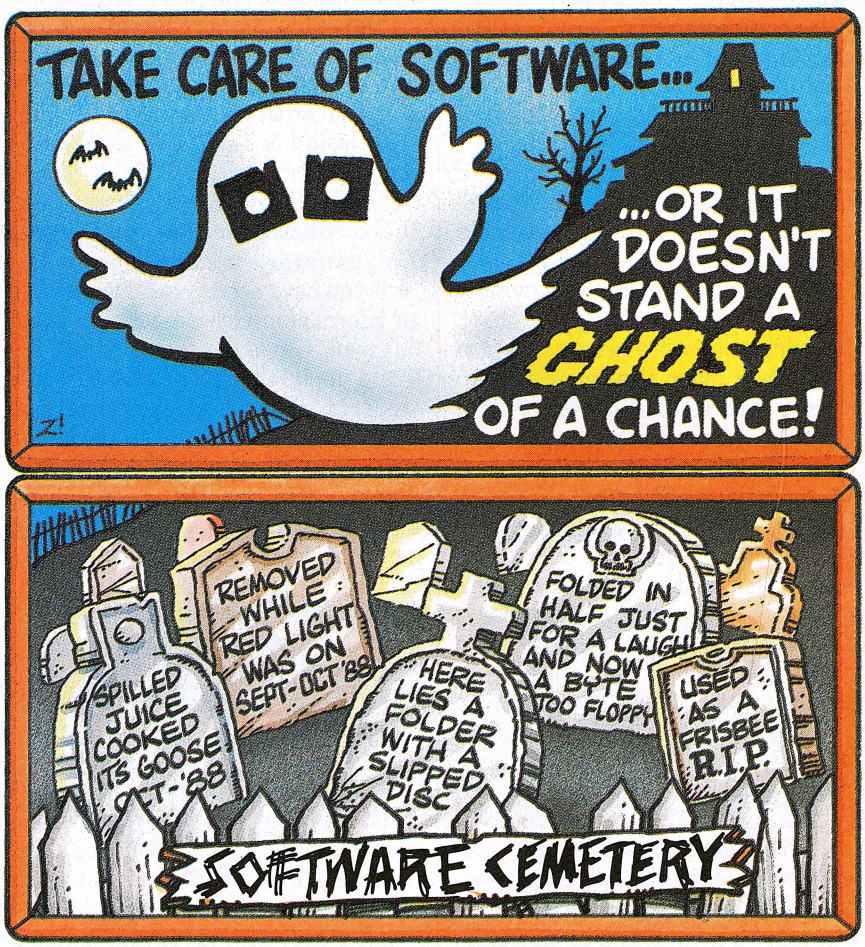
To familiarize my students with the parts of a spreadsheet, I have devised a game that not only teaches cell coordinates, but reinforces the correct use of computer terms as well.

"Quadricalc" is similar to tic-tac-toe, except that your chalkboard-drawn game board should contain four squares across and four squares down, instead of the usual three. As with a real spreadsheet, the vertical columns are lettered A to D; the horizontal rows are numbered one to four. Students are grouped into three teams, and each is assigned a chalk color or a symbol "game piece" by which it is identified — such as "X," "0," or "*."

In turn, a student from each team is asked a computer literacy question. Very often what I like to do is describe a computer part, and have students name it. The first child to correctly answer a question is allowed to place his or her team's "game piece" anywhere on the Quadricalc board that the child wants. He or she must, however, identify that position by its correct cell name. Correctly answering a question does not give a team permission to immediately take another turn.

The winning team is the first to place its game pieces in four cells in a row or column, four cells in the diagonal (A1, B2, C3, and D4; or A4, B3, C2, and D1), in any four contiguous cells (such as B2, B3, C2, and C3) or in the four outside corner cells (A1, D1, A4, and D4). Teams may also, of course, try to block other teams from completing a row, column, diagonal, or square.

Monna Greenstreet
Hillside Junior High School
Manchester, NH



Ghosts, graveyards, and dead disks haunt this super-spooky classroom display about floppy disk care.

RETURN OF THE DEAD DISKS! HALLOWEEN BULLETIN BOARDS

Rather than discard scratched and otherwise damaged software disks, I use these to demonstrate to students the ways that software should — and should not! — be handled. For Halloween, I then enlist my students' help to create a "Software Cemetery" bulletin board display.

Using construction paper, each child creates a "tombstone" for an imaginary software disk, explaining the way that the disk "died." (Examples include: "Here lies a disk that was sitting too near the radiator," or "Rest in Peace. Juice spill. October, 1988.")

To further drive home their lesson on proper disk care, my students and I create a second Halloween bulletin board to complement the first one. This consists, simply, of a large ghost figure with two no-longer-usable software disks for eyes. The caption: "Take Care of Software . . . or It Doesn't Stand a Ghost of a Chance!"

Sara Hunter
Providence Day School
Charlotte, NC

(continued on page 56)

Scholastic introduces breakthrough learning software for kids in grades 1-4.

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Presenting the first software series designed to enrich every key curriculum area in grades 1-4—and delight kids, too!

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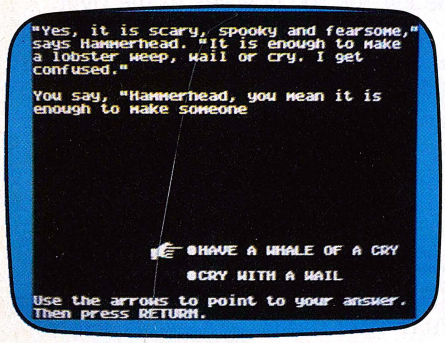

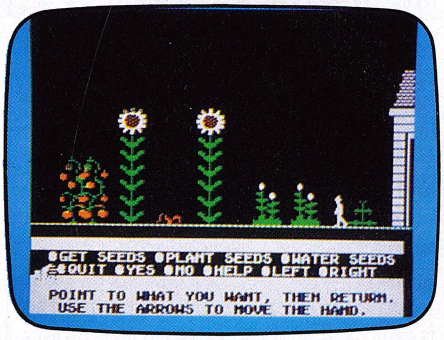

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For information or to order, call us toll-free 800-541-5513. In Missouri call 800-392-2179.

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TEN DATA BASE IDEAS THAT KIDS'LL LOVE

Below are ten data base topic ideas that I've used with students over the years. All have met with enormous success.

Under each topic, I have listed possible data fields to include in the file, as well as — where applicable — reference sources for students to consult when researching information about each one.

1. Rock Stars Data Base

STAR'S NAME:
NUMBER OF HIT RECORDS:
DATE BORN:
PLACE BORN:
HOBBIES:
(Information can be found in music, gossip, and teen magazines.)

2. Cars, Trucks, and Motorcycles Data Base

VEHICLE NAME:
MANUFACTURER:
WEIGHT:
LENGTH OF VEHICLE:
NUMBER OF CYLINDERS:
HORSEPOWER:
PRICE:
(Information is available in car and motorcycle magazines.)

3. Favorite Books Data Base

BOOK TITLE:
AUTHOR:
MAIN CHARACTER:
SETTING:
TYPE OF BOOK:
SHORT DESCRIPTION:

4. Countries Data Base

COUNTRY:
CAPITAL:
POPULATION
PER CAPITA INCOME:
TOTAL POPULATION:
TYPE OF GOVERNMENT:
(Information is available in almanacs, encyclopedias, and social studies text books.)

5. Sports: Data Base of Teams

TEAM NAME:
SPORT:
HOME CITY:
LEAGUE:
LAST SEASON WINS:
LAST SEASON LOSSES:
MANAGER:
(Have students refer to sports magazines and end-of-the-season newspaper articles.)

6. Sports: Data Base of Players

PLAYER'S NAME:
SPORT:
POSITION HE/SHE PLAYS:
WEIGHT:
HEIGHT:
STATISTICS:
COLLEGE:
(Have students refer to sports magazines and newspaper articles.)

7. Animals Data Base

NAME:
CLASSIFICATION:
MAXIMUM WEIGHT:
DIET:
NATIVE CONTINENT:
(Information can be found in encyclopedias and science books.)

8. Television Programs Data Base

PROGRAM:
TYPE OF SHOW:
MAIN STAR:
WHAT TIME IT AIRS:
HOW LONG IT'S BEEN ON THE AIR:
COMMENTS ABOUT THE SHOW:
(Have children consult local newspaper or TV Guide *listings.)*

9. Cinema Stars Data Base

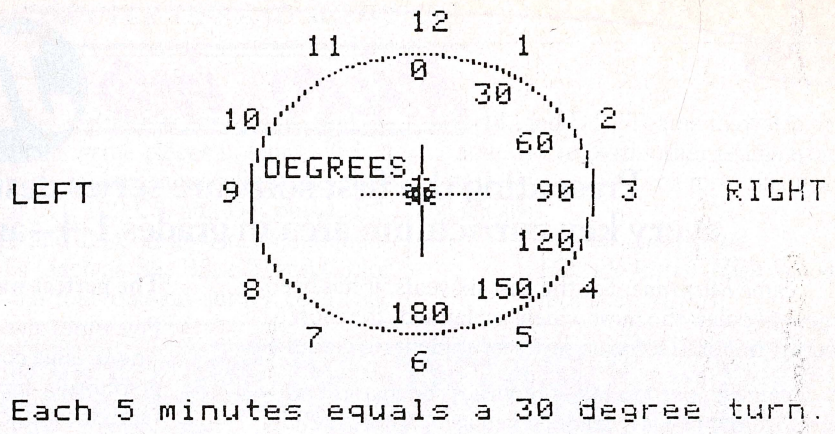
NAME:
DATE BORN:
PLACE BORN:
MARRIED TO:
MOST FAMOUS MOVIE:
MOST FAMOUS ROLE:
(Information is available in encyclopedias, Current Biography Yearbook, *and movie trivia books.)*

10. Me and My Classmates Data Base

STUDENT'S NAME:
NUMBER OF BROTHERS:
NUMBER OF SISTERS:
PETS:
DATE OF BIRTH:
HOBBIES:
HAIR COLOR:
EYE COLOR:
HEIGHT:

Brad D. Bolnik
Endwell, NY

(continued on page 58)



"HOW MANY DEGREES AT 4 O'CLOCK?" LOGO DISPLAY CHART

Learning how to turn the Logo turtle is an easier concept for my students to grasp, I have found, once I've draw a comparison between this and the number of minutes in an hour. Every five minutes on the clock face, I show the children, corresponds with 30 degrees on their Logo computer screens. To turn the turtle "to 4 o'clock," my programmers now know, they need to go either 120 degrees to the right or 240 degrees to the left. Likewise, a student wishing to move the turtle "to 10 o'clock" needs to turn 60 degrees to the left, or 300 degrees to the right.

The chart shown here, which can be copied and posted on a classroom bulletin board, helps make the comparison visually.

Robert Scheinblum
Cutler Ridge Elementary School
Miami, FL

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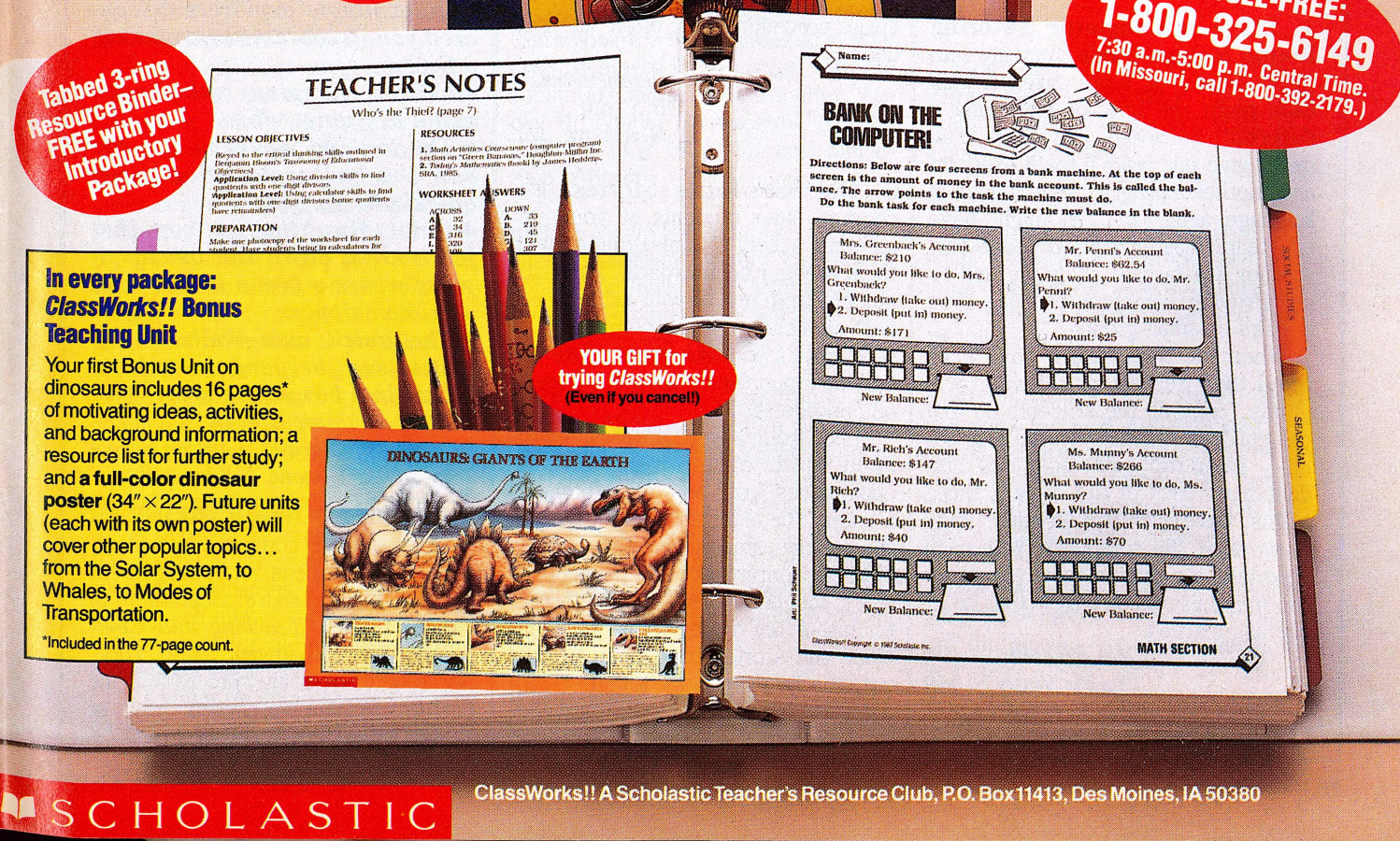
for grades 3-5



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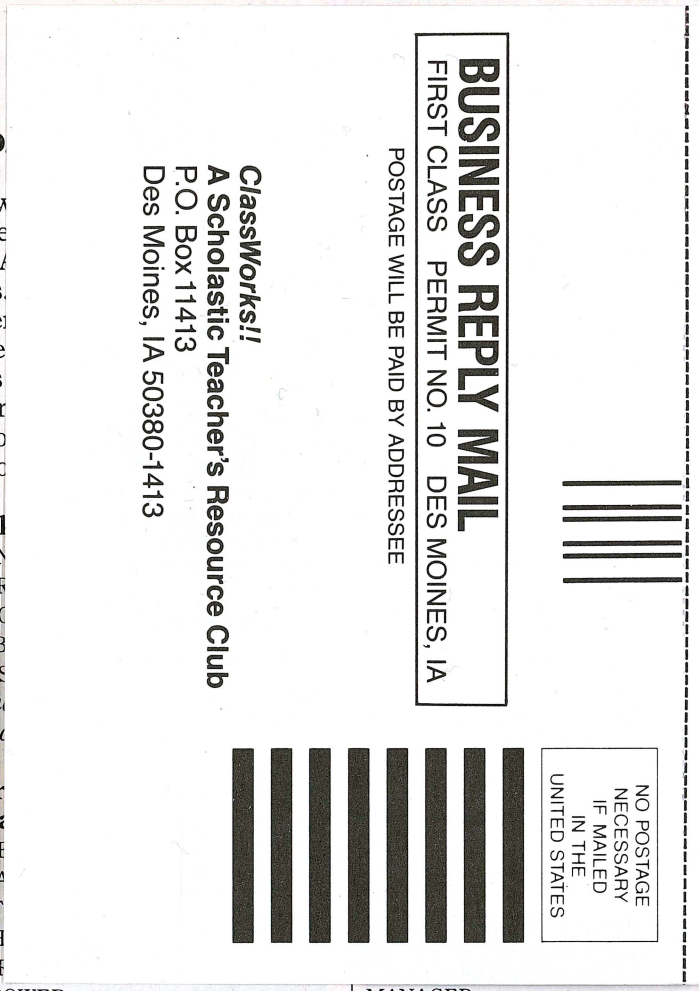

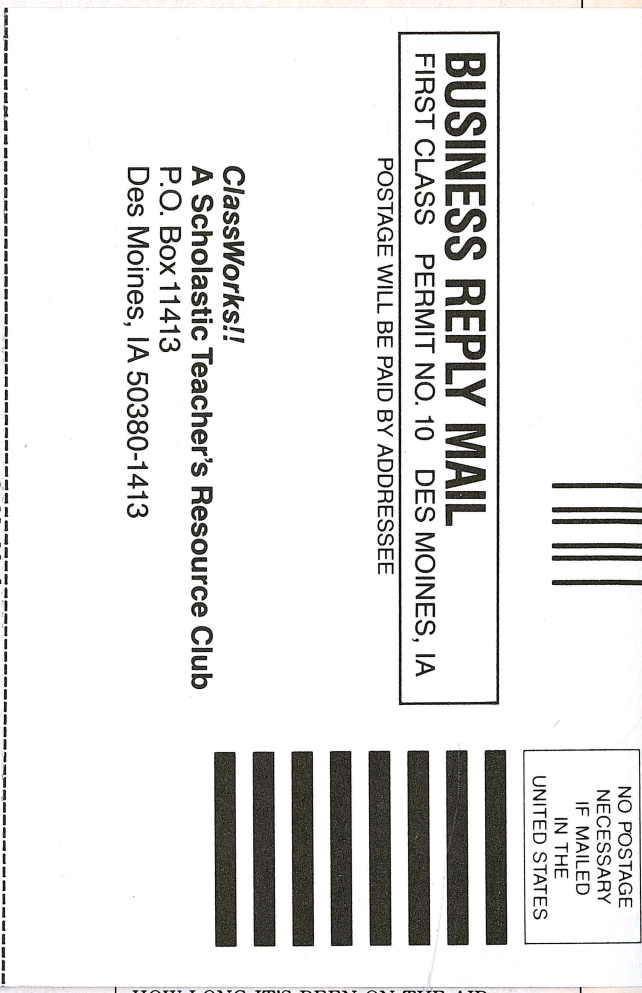

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PRICE:
(Information is available in car and motorcycle magazines.)

3. Favorite Books Data Base
BOOK TITLE:
AUTHOR:
MAIN CHARACTER:
SETTING:
TYPE OF BOOK:
SHORT DESCRIPTION:

4. Countries Data Base
COUNTRY:
CAPITAL:
POPULATION
PER CAPITA INCOME:
TOTAL POPULATION:
TYPE OF GOVERNMENT:
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PETS:
DATE OF BIRTH:
HOBBIES:
HAIR COLOR:
EYE COLOR:
HEIGHT:

Brad D. Bolnik
Endwell, NY

(continued on page 58)

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- And the *ClassWorks!!* curriculum-based approach—lessons in *every subject, every time*—Mathematics, Social Studies, Reading, Language Arts, Science as well as Holiday/Seasonal activities in many subjects.
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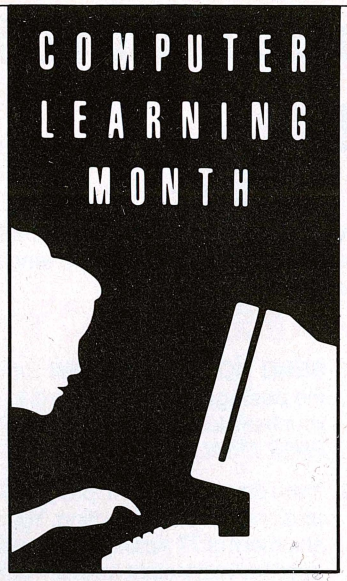


IDEAS FOR COMPUTER LEARNING MONTH

October is Computer Learning Month and this year's theme, "Take Part in Computer Learning Month: You'll Love the Relationships That Develop," reflects the belief that computer learning encourages personal interaction. (For more information, contact Computer Learning Month, P.O. Box 60007, Palo Alto, CA 94306-0007.) Below are three ideas that further the interaction theme. In all, of course, the classroom computer plays a leading role!

1. Stage a Computer Tutoring Round Robin. Divide students into three teams of equal size. Assign each team the task of mastering a different software program. You might give one team a math program and another a program that is used in language arts. Or, you might have one team master a word processor, another a data base program, and so on. Provide computer practice time in pairs or small groups.

When the three teams have mastered their respective software programs, regroup the students so that the children are now working in trios — each trio containing one student from each of the original three teams. Give each trio an opportunity to work at the computer, with each child taking a turn to teach the other trio members the program that he or she has learned.

Pat Birdsell
Pacific Valley School
Big Sur, CA

2. Hold a Logo Procedure Swap Meet. "How did you do that?" is a question that students frequently ask one another when creating Logo graphics. This activity capitalizes on childrens' curiosity, and allows students to share procedures at the same time.

First, have each child select his or her favorite original Logo graphic. (Encourage students to select from their shorter and less complex work.) Help each child make a printout of his or her graphic. Then, reinsert the paper into the printer and print out the procedure(s) needed to make that graphic on the opposite side of the page. Have each child write his or her name in a corner of the paper. Then collect and randomly redistribute the sheets.

Have each child take a turn at the computer, experimenting with the procedure(s) that he or she has been given. If and when a problem is encountered, tell students, the original programmer is the person to consult. Each child should also be given an opportunity, after "playing" with a procedure, to show the original programmer what he or she has done.

Have your young Logo-lovers swap procedures as often as they like.

Joanne Davis
P.S. 6M
New York, NY

3. Big Kids/Little Stories. Encourage older students at your elementary school to make friends with their younger counterparts. Pair each student from one of your school's upper elementary classrooms with a child from a younger grade. Give the two an opportunity to get to know one another first.

Next, using a word processing program, have each pair of new acquaintances write an original story as a team. The older child might type as the younger student dictates. Or, the older student might write parts of the story independently, leaving blanks for his or her young friend to fill in. Once the stories have been printed out, the two can work together with a graphic arts software program and/or crayons and markers to create illustrations with which to decorate their page.

As a wrap-up activity, have the older students pay a visit to the younger students' classroom. Have each older/younger pair read aloud their tales. Then post the stories on a bulletin board, first in the young students' classroom, and then on a board where the older children learn.

Nancy Kuechle
Horace Mann School
Beverly Hills, CA

KEYBOARDING: THE QUICK BROWN FOX, LAZY DOGS, AND OTHERS

Once my students have learned the entire computer keyboard, I like to have them practice their new typing skill with the sentence "The quick brown fox jumped over the lazy dogs" because it contains all 26 letters of the alphabet. When the kids grow tired of this, however, I challenge them to come up with their own all-letters sentences. Here are a few that I particularly like:

- ***A soda jerk explained how fizzy beverages quench my thirst.***
- ***Quiet jungle explorers discovered young zebras while making a fire.***
- ***Crazed jumping xylophones make few quiet vibes.***
- ***The fox and jackal at the zoo saw the bad apple being eaten quickly by vermin.***
- ***Quiet Max, the fat boy that just moved down the block, always wears a green jacket with a broken zipper.***
- ***The quick man walked very fast to see the penguin and the jackal in a box at the zoo.***

Marc Epstein
Clara H. Carlson School
Elmont, NY

SEND US YOUR MICRO IDEAS

Do you have computer activities, bulletin board ideas, or management tips you'd like to share? Send them to "Micro Ideas," *Teaching and Computers*, 730 Broadway, New York, NY 10003. We'll pay $15 to $30 for each Micro Idea we publish. ■

Early Reading with Computers

BY TRISHA AINSA

Using the computer can be one of the most exciting ways to teach reading to young children. The computer is a multisensory learning tool, and software programs geared to different learning modes — visual, tactile, and auditory — are available to meet the learning styles of all students. The computer can provide the young child with the high level of motivation important for success at the early stage of learning.

Many educational researchers support the use of computers for reading instruction. For example, Douglas H. Clements states in "Computers and Young Children: A Review of Research" *(Young Children,* November, 1987) that "first graders read with computer programs emphasizing letter recognition and recall, sight words, spelling, phonics, and sentence and word meanings. . .It has been demonstrated that about 10 minutes work with software per day significantly benefits primary grade children's reading skill development."

MANAGEMENT TIPS

For the activities suggested in this column, the self-contained primary classroom should be organized into work areas: a large group area where children's desks are located, a computer center with adequate space for groups of children to work at each computer, and a library center with a variety of books and seats for reading groups. This arrangement makes it possible for the class to participate in different activities simultaneously while a teacher monitors, and for the computer center to become a natural part of the classroom.

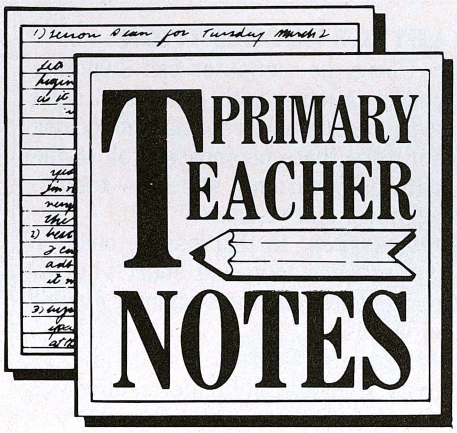
SOFTWARE RESOURCES

Using good reading programs on the computer helps children develop readiness skills and a sense of confidence, and allows them to use written language for the purpose of communication right from the beginning.

In addition to some of the software packages listed below, the lesson plans on pages 60 and 61 may also require use of a word processing program and a graphics program. See "First Steps" in the September 1988 *Teaching and Computers* for recommended packages.

Prereading and Reading

Alphabet Circus (DLM). Six animated letter games with a circus theme. Apple II family, Commodore 64/128, IBM PC/PCjr, PS/2, Tandy 1000, $32.95.



Early Games for Young Children (Springboard). Nine games help children recognize letters, type with the computer, and spell their names. Apple II family, Commodore 64/128, IBM PC/PCjr ($34.95), and Macintosh ($49.95).

Getting Ready to Read and Add (Sunburst). Children identify and match upper- and lower-case letters. Apple II series, Commodore 64/128, IBM PC/PCjr, Tandy 1000,$65.

Stickybear ABC (Optimum Resource). Alphabet program which features high resolution graphics. Apple II family, $39.95; Commodore 64/128, Atari family, $29.95.

Kindercomp (Spinnaker). Six games, including type-in names and matching letters. Apple IIe/II+, IBM PC/PCjr, $29.95.

Word Bank (Mindscape). Four games, including practice on long and short vowel sounds. Apple II family, $49.95.

Sound Ideas: Word Attack (Houghton Mifflin). Combines sight and sound to reinforce phonics. Requires speech synthesizer. Apple II family, $165.

Reader Rabbit (The Learning Co.). Four reading games using words with consonant-vowel-consonant structure. Apple II family, Commodore 64/128, IBM family, $39.95; Apple IIGS, Macintosh, Tandy 1000, $59.95.

Stickybear Reading (Optimum Resource). Builds basic sight vocabulary. Apple II family, IBM PC/XT/AT, PS/2, $39.95; Commodore 64/128, $29.95.

Word Munchers (MECC). Matching games for vowel sounds. Apple II family, $55; 3½-inch disk,$59.

Muppet Word Book (Sunburst). Covers upper-and lower-case letters, word endings and beginnings, consonants and vowels. Apple II family, $65.

Letters and Words (Mindscape). Three games, including sight word reading. Apple II family, IBM PC, Tandy 1000, $49.95

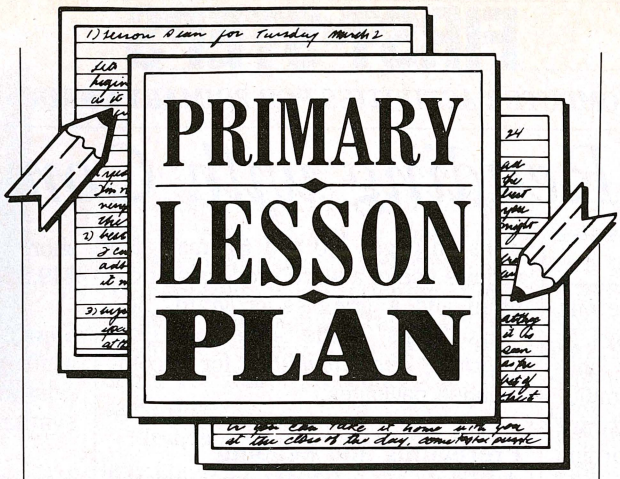
Helpful Peripherals

Computergarten Keyboard-on-the-Floor (Scholastic). An enlarged computer keyboard allows children to step, hop, and crawl on desired keys, $69.95.

KoalaPad Touch Tablet (Koala Technologies, Inc.). A graphics pad that allows children to draw pictures on the monitor. Apple II family, $124.95; Commodore 64/128, $99.95; IBM family, $163.95.

Touch Window (Edmark). Allows children to direct computer by touching the screen instead of using the keyboard. For Apple II family, $189.95.

(continued on page 60)



NOTABLE NAMES

Early personal association with reading experiences is an important part of a child's development. When children begin school, one of the first words they learn to recognize is their name.

Objectives: In this lesson, each child will learn to find his or her name among other children's names; be able to find and use the cursor keys and the space bar on the computer keyboard; and be able to locate the letters of his or her name on the computer keyboard and the Keyboard-on-the-Floor.

Materials Needed: The classroom centers should be set up with the following materials:

- **Computer center** — A transparency with all of the children's names on it; a KoalaPad with accompanying software, or a joystick; the early game program *Kindercomp;* the Scholastic Keyboard-on-the-Floor; and a selection of early reading software such as *Muppet Word Book, Letters and Words,* and *Alphabet Circus.*
- **Library center** — Suggested books include *Sandy Signs His Name, Andy (That's My Name), What's Your Name?, I Know Lots of Things,* and *The Bear Who Took Skipper's Name.*

Discussion: Tell the children that they all have something that belongs to them that is very special: their name. Write your own name on the board, and tell the children, "This is the way I write my name. Whenever I put my name on things it shows other people that the thing is mine. Let's learn to find our name when it is written."

Activity: Move the children to the computer center and connect the KoalaPad or joystick. Tape the transparency of class names to the monitor. Show the children how to find their name by moving the cursor with the KoalaPad or joystick to the name and then drawing a circle around it.

Activity: Load the software program *Kindercomp.* Select from the menu the game "Names." Children can type in their names and watch the monitor as the package expands them. The other software packages listed with this activity are also useful for names and letters in names. Let the children take turns using them.

Activity: Position the Scholastic Keyboard-on-the-Floor in a clear area of the classroom, and have children take turns finding and jumping on the letters of their name.

LETTER RECOGNITION

Using the computer can enliven a child's practice with letter and sight word recognition, especially if you use software that encompasses all of the different learning styles — tactile, auditory, and visual.

Objectives: In this lesson, children will practice long and short vowels, consonants, and the beginning sounds of words.

Materials Needed: For the first activity, equip the computer center with the program *Word Bank.* For the second activity, you'll need the Edmark Touch Window; the *Sound Ideas* software package; one ditto for each consonant, showing upper- and lowercase versions of the letter no less than three inches tall; and a supply of toothpicks for each child. The third activity requires *Letters and Words,* an alphabet chart to post in the computer center, and a picture dictionary (optional).

Preparation: Review with your students the long and short vowel sounds, then demonstrate how to use the *Word Bank* software.

Activity: Have students take turns working through the long and short vowel sound games of *Word Bank.*

Preparation: Insert the *Sound Ideas* program, and attach and adjust the Touch Window using the supplied Velcro.

Activity: Assign children to the computer in groups of three. Assist the first group to load the software and start with the letter "T." Using the Touch Window, show each child how to trace and say the name and the sound of the letter "T."

When each child in the group has done this four or five times, hand each student the consonant ditto for "T" and eight toothpicks. Have children return to their seats and glue toothpicks on the outlines of the letters. Keep their letter sheet in a designated location until the glue is dry.

For the remainder of the lesson on the letter "T," have the children trace over the letters "T" and say the sound of the letter, until they know it by memory. Complete the learning activity with the rest of the consonants in the alphabet.

Preparation: Demonstrate the *Letters and Words* software program for the children. All children should be at their desks with paper and pencil, except the children taking their turn at the computer. All children should be able to see the computer.

Activity: Tell the children to match the beginning letter with the picture they see on the computer. To do this, they name the picture shown on the computer screen and say the beginning sound. When the correct letter shows in the box, the children at the computer should press the space bar. Children at their desks can try to write the letter and check and correct their responses when the correct answers appear on the computer. For an extra challenge, you might turn this activity into a race.

TEDDY TAKES A TRIP

The classroom teddy bear becomes a valued teaching assistant through this integrated reading/language arts lesson. After extending an invitation, each child takes Teddy on an overnight or weekend visit. When Teddy returns to class, the child dictates a story to the teacher about the trip, or writes the story by him- or herself. Older primary level children can keyboard their own stories. The story is then printed, published, and read by the class. Your students will improve in reading skills as they read their books about their own experiences.

For a variation of this activity, a toy "pet cat" theme could be substituted for the teddy bear. The software package *Create with Garfield* by DLM is available to use for graphics.

Objectives: The children will dic-

tate, illustrate, publish, and read a language experience story based upon a recent happening with Teddy.

Materials Needed: Stock your classroom centers with the following materials.

- **Computer Center:** Have on hand a children's word processing program such as *Bank Street Writer* (Scholastic) or *Magic Slate* (Sunburst); a graphics/-printing program such as *The Print Shop* (Broderbund) or *Teddy Bear-els of Fun* (DLM) for creating bear's stationery and illustrating the stories; a stuffed teddy bear. You'll also need colored pencils, crayons, scissors, rubber cement, a stapler, and staples.
- **Library Center:** Collect such bear-related books as *Winnie the Pooh, The Jungle Book, The Three Bears, The Care Bears, Counting Bears, The Berenstain Bears, The Baby Bear,* and *Teddy Beddy Bears.*

Preparation: Use your graphics/-printing program to create "Bear's Stationery" and "Bear's Appointment Calendar." Set aside and decorate a classroom bulletin board as a message center for notes to and from Teddy.

Discussion: Introduce your class to Teddy, and explain to students that Teddy with be able to go home with them — to spend the night, go to birthday parties, or take a family trip. All students have to do is write him a letter and invite him! Tell students that Teddy will write back and give the date when he can go. Explain that each time Teddy returns to school, his host or hostess will write a story about the trip on the computer. Later, each student will turn his or her favorite Teddy stories into books to share with the class, friends, and family.

Activity: Write a letter to all children from Teddy encouraging them to write to him and invite him home. Respond to invitations and keep track of turns. Send Teddy home with the children.

Activity: As Teddy returns from his visit with each child, assist that child to write and print the language experience story on the word processor. Be sure the student can see the monitor as he or she speaks. (Older students can use a program like *Teddy Bear-rels of Fun* to write and read entire books about Teddy with little assistance from the teacher.) When the story is complete, the child will read it to the class.

Activity: Save each child's story so that it can be made into a book at a later time. These books could be shared with other classes, put in the school library, and/or sent home to parents so that the children can share them with the family.

Activity: While the child and the teacher are writing the language experience story, the balance of the class is engaged in free reading of books about bears (see "Materials Needed," above). To add to this list, each child can bring a storybook about a bear to class.

Extension Activity: As a follow-up on their Teddy tales, help your students create and celebrate a National Teddy Bear Day. As a class, brainstorm some ideas that might be associated with such a holiday. Let children dictate or write short speeches commemorating the teddy bear and its holiday, then have them practice reading these aloud.

Next, set a date for the celebration. Invite your students to bring their own teddy bears to school for the party. Provide plenty of punch and bear-shaped cookies. Gather your students into the large group area of your classroom, have them draw lots for reading their remarks to the class, and let the "speech-ifying" begin! ■

Children read about bears, bring Teddy home for a visit, then write their own stories to share with the class.

MICHAEL DONATO

Language experience: Improving reading through writing.

SOFTWARE SHOWCASE

SOFTWARE RECOMMENDED FOR TEACHERS, BY TEACHERS

REVIEWED THIS ISSUE:

- **THE MATH FACTORY**
- **STANDING ROOM ONLY? A Study in Human Population Growth**
- **1-2-3 SEQUENCE ME**
- **MASTERING MATH MANAGEMENT SYSTEM**
- **CACTUS FACTORY**

EDITED BY ELLEN CHAFFIN

Added Attractions

With "talking" software, children can literally hear their mistakes, and can structure their own learning as a result.

There are several different types of speech technology — digitized, synthesized, and custom-encoded. Digitized speech consist of sounds or words that have been prerecorded by a person and then fed through the computer. The advantages are that the speech is clear and of the highest quality. However, digitization takes up a lot of memory: no more than 300 digitized words can be saved on an 800K disk. This can be limiting.

Synthesized speech is generated by the computer. The computer is given a set of phonetic rules and literally sounds words out. While these sounds are robotic, children have no trouble understanding this voice. Moreover, since the speech is computer-generated, there is no limit to the computer's speech capabilities.

Custom-encoded speech merges the two technologies. Like digitized speech, it starts as a human recording, but then is compressed and stored on a special chip. It requires less memory than digitized, and is more realistic than synthesized.

Newer computers like the Apple IIGS, Macintosh, IBM PS/2 Model 25 and 30, and Tandy 1000SL and 1000TL include speech capabilities. Owners of older machines can purchase add-ons, such as the Echo board from Street Electronics for both the Apple and MS-DOS machines, and IBM's own speech peripheral.

Here is a list of some of the software that will bring speech to your classroom.

DIGITIZED

Alphabet Blocks, Macintosh with 1MG memory, $49.95. Bright Star Technology, 14450 NE 29th Pl., Suite 220, Bellevue, WA 98007.

***Listen and Learn Series*: Sound Ideas-Early Reading,** $570, **Spelling Speechware,** $510, **Reading Comprehension,** $177; Apple II family. Houghton Mifflin Educational Software Div., PO Box 683, Hanover, NH 03755.

Talking Reader Rabbit, Apple IIGS, Tandy 1000, $59.95. The Learning Co., 6493 Kaiser Dr., Fremont, CA 94555.

Writing to Read, IBM family, $716. IBM Educational Software, One Culver Rd., Dayton, NJ 08810.

SYNTHESIZED

Talking Text Writer, Apple II family, MS-DOS, $149.95. Scholastic, 2931 East McCarty St., Jefferson City, MO 65102.

Primary Editor Plus, IBM family, $100. IBM Educational Software, One Culver Rd., Dayton, NJ 08810.

CUSTOM-ENCODED

Easy Street and ***Cotton's First Files,*** Apple II family, $49.99 each. MindPlay, 100 Conifer Hill Dr., Danvers, MA 01923. — *Ellen Chaffin*

THE MATH FACTORY

Grade Level:
1 - 8

Subject Area:
Math

Computers:
Macintosh 512, Plus, SE, and Mac II

Memory Requirements:
512K

For teachers and students lucky enough to have a Macintosh computer, *The Math Factory* is a must! Complete with a user-friendly Mac interface, the program provides a myriad of options. Teachers can choose from 10 levels of difficulty for addition, subtraction, multiplication, division, fraction, and decimal problems. They can select like/unlike denominators and whole/not-whole numbers when working with fractions. In addition, they can target decimal problems for addition, subtraction, multiplication, or division. Thus, teachers have almost total control of the program.

Part of the Mac interface, the *Special* window, provides additional abilities. This window offers teachers the option to use or not use reward responses, choose from four speeds, and indicate the number of decimal places desired when doing decimal problems.

The software's screen format is easy to follow and contains enough sound and graphics to add interest, but not to detract from the main purpose of the software: learning and practicing math.

The Math Factory includes two particularly nice features which set it apart from the less effective drill and practice programs cluttering the educational market. The first is the way the cursor positions itself after each input, making understanding of place values essential for the student working the problems. For example, in a multiplication problem such as 234 x 25, you must enter a 0 before multiplying with the 2 in 25. The second feature incorporates a visual process of carrying and/or borrowing (remain-

ders) in order to get the correct answer. Although not mandatory, simply pressing the space bar positions a small question mark above the appropriate number and lets the student input the amount to be carried and/or borrowed. This is beneficial for younger children just learning the concept, as well as students working on longer, more difficult problems, who need a visual reminder.

A big plus for the math teacher is the program's ability to print out worksheets. Choosing from a vast number of types and levels of math problems, teachers can print both a full page worksheet for their class and an answer sheet for themselves. This feature alone makes *The Math Factory* a justified purchase, even for those teachers who cannot provide Mac access to all their students.

The program includes a record-keeping feature that allows teachers to print a "report card" for each student. This feature's only drawback is that it prints a full report of the child's score on every level and type of problem — even those levels not attempted by the child. Four full pages print out for each individual report — making it something you would not want to do too often.

The documentation is adequate but not lavish. It consists of a small manual with instructions for the technical aspects of working the problems. There are no additional suggestions or extension ideas for creative ways to use the program. However, *The Math Factory* is so well written and easy to use that most teachers will have no difficulty putting it to good use, both with their students and for their own planning and preparation.

Integrated Software, 5795 North River Road, Freeland, MI 48623 (mail order only); $39.95; back-up not included.

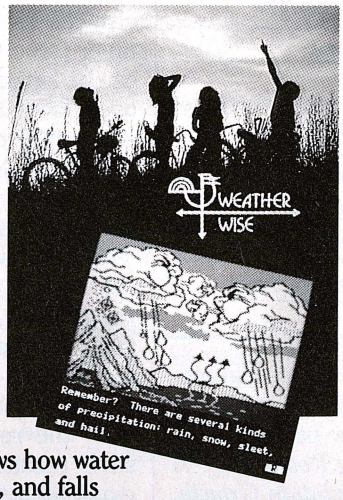
Dee Miller, *Computer Coordinator, St. James Day School, Texarkana, TX.*

(Circle 101 on Product Info. Card)

(continued)

PROGRAMS FOR A RAINY DAY

New from **MCE**... programs to help your students understand the weather. There's microcomputer software (THE WATER CYCLE, AN OCEAN OF AIR, and FORECASTING THE WEATHER) and a WEATHER-WISE video. In addition to these programs, there are reinforcement worksheets and exercises – a wealth of activities for your rainy days!



THE WATER CYCLE shows how water evaporates, forms clouds, and falls again. AN OCEAN OF AIR covers temperature, pressure, humidity, and air movement. After FORECASTING THE WEATHER, students can set up a weather station and make forecasts themselves! Students will experience the wonders of nature without leaving the classroom. Do fish bite better before it rains? Does the weather affect bees? How much water evaporates from trees?

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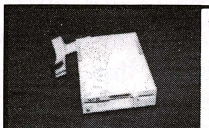

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STANDING ROOM ONLY? A Study in Human Population Growth

Grade Level:
8 and up

Subject Area:
Social Studies

Computers:
Apple II family

Memory Requirements:
64K

If you're interested in demographics, then you will be very impressed with a new package from Sunburst: *Standing Room Only? A Study in Human Population Growth.* This interactive program allows students to make population projections and then observe the results of these projections via a series of graphs which can be viewed on the screen or printed out.

Standing Room Only? is not a toy. It is an electronic laboratory where students develop and test hypotheses, and conduct experiments. To do this, they choose one of seven countries available on a world map. These countries represent a variety of population types throughout the world. Once a country is selected, students then have the option of starting a model using the existing variables, altering variables, or finding out more about the country they have chosen.

To build a model, users begin by creating a population graph using the existing data. A line graph appears that starts in 1985 and continues in five year increments until 2100, and the program automatically rescales the graph so that it fits on the screen. Students may press the space bar at any time during this process to pause for a closer analysis of the results. During this break, they can examine age/sex profile, crude birth/death rates, or the population/time graph. They can read about the country, including information on population rank, present birth and death rates, and population density. Or they can alter a variable, save the experiment, or quit. While the program is a little slow in creating its 115 year screen model, the reasons are clear: users can thus observe incremental changes as they alter variables over time. Once the model is complete, it can be saved on the program disk and used later to compare with results from other experiments.

The modeling procedure is neat, but the real power of the package lies in the user's ability to alter variables. This dynamic allows students to view the effects of migration rate, family composition, and life expectancy on a country's population. Moreover, this encourages students to develop and test hypotheses. They can both view the results immediately and/or save results and compare different experiments. Up to 20 experiments can be saved for further comparison, and their combined results can be printed out.

One excellent aspect of the printouts is that the variable information for each experiment is shown just below the graph and on the same page. This makes comparisons very easy. In fact, it is easier to compare results on the printout than on the monitor, which demands that users flip between the variable screen and the graph screen.

Standing Room Only? does lack a little pizzazz in the graphics and sound department. In these days of RGB monitors and Ensoniq chips, not much of an attempt was made to take advantage of these new capabilities. For instance, it would be nice when comparing experiments to be able to use different colors in the line graph to represent the varying experimental results. This does not detract from the program's pedagogy, but much could have been done to "spice up" the visual aspects of the program.

The documentation includes five classroom activities, most with reproducible worksheets. The topics range from definitions to achieving zero population growth. These activities provide students with both a solid knowledge base, and opportunities to develop problem-solving skills such as using a model, estimating, projecting, and information gathering. These activities in themselves consti-

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PRODUCT INFORMATION

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(Expires February 1)

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a. ☐ IBM/MS-DOS Compatible
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c. ☐ Greater than $20,000

3. On which computer system will you or your school/district/college use these products:

a. ☐ IBM/MS-DOS Compatible
b. ☐ Apple II Series
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tute a fine teaching unit on population dynamics. Once this unit is completed, the potential of *Standing Room Only?* is limited only by your own teaching creativity.

Sunburst, 39 Washington Ave., Pleasantville, NY 10570, 800/436-1934 or 914/769-5030; $65 per package, lab packs available; backup included, 30-day preview.

Bob Stackpole, *Computer Coordinator, SAD#57, Waterboro, ME.*

(Circle 102 on Product Info. Card)

1-2-3 SEQUENCE ME

Grade Level:
K - 2

Subject Area:
Language Arts

Computers:
Apple II family

Memory Requirements:
64K

Additional Hardware:
Muppet Keys (optional)

Sunburst's *1-2-3 Sequence Me* is an early learning program that teaches sequencing skills. This relatively simple three-part program includes a five-section menu and on-screen directions. The program begins with a pictorial menu, showing users what they can do. Then users sequence three events at a time, and the same set of 20 events are used over and over in each section.

The directions serve as a nice tutorial, complete with pictorial examples so that teachers can both review it themselves and go over it with students. Students are asked to type in their names at the beginning of each round, then choose the number of examples they would like (1-20).

Examples of sequences include: one snowball, two snowballs, snowman; firewood, match lighting firewood, campfire; fish swimming, fish eating worm, fish on hook; egg in nest, egg hatching, baby bird; empty glass, pouring milk into glass, full glass.

Part I, for pre-readers, is all graphics. Three pictures are displayed and smaller boxes appear underneath the pictures. Using either the *Muppet Keys* or the keyboard, students enter 1, 2, or 3 under the appropriate box. If the answer is correct, a dog on the lower left of the program screen, wags his tail, shakes his head up and down, or claps. Then the pictures at the top are rearranged so that students can see the story in order. The program continues to the next problem when students press *Go* (on the *Keys)* or *Return* (keyboard). If the answer is incorrect, the dog shakes his head and says "Try again." However, if wrong a second time, the answer is shown. Following the requested number of rounds, a score is given, only including those answered correctly on the first try.

Part II of the program combines text and pictures. Two of the boxes contain vocabulary words and one has pictures. This part is intended for beginning readers. For more advanced readers, Part III of the program places text in all three blocks. All aspects of both Parts II and III run identically to Part I.

1-2-3 Sequence Me is a nice addition to an early childhood classroom. It has a motivating display and is simple enough for young children. The pictorial menu allows even non-readers to use the program, and the *Muppet Keys* are an additional bonus for young fingers. Throughout school, sequencing is a difficult skill to acquire mastery. Forms of this activity have been done for years without technology. However, technology offers the important aspect of immediate feedback, and allows children to run the activity on their own.

One of Sunburst's greatest strengths is the quality of its documentation, and this program's documentation is no exception. It nicely delineates classroom applications in terms of description and objectives, and there are a number of activities complete with duplicable sheets to

(continued)

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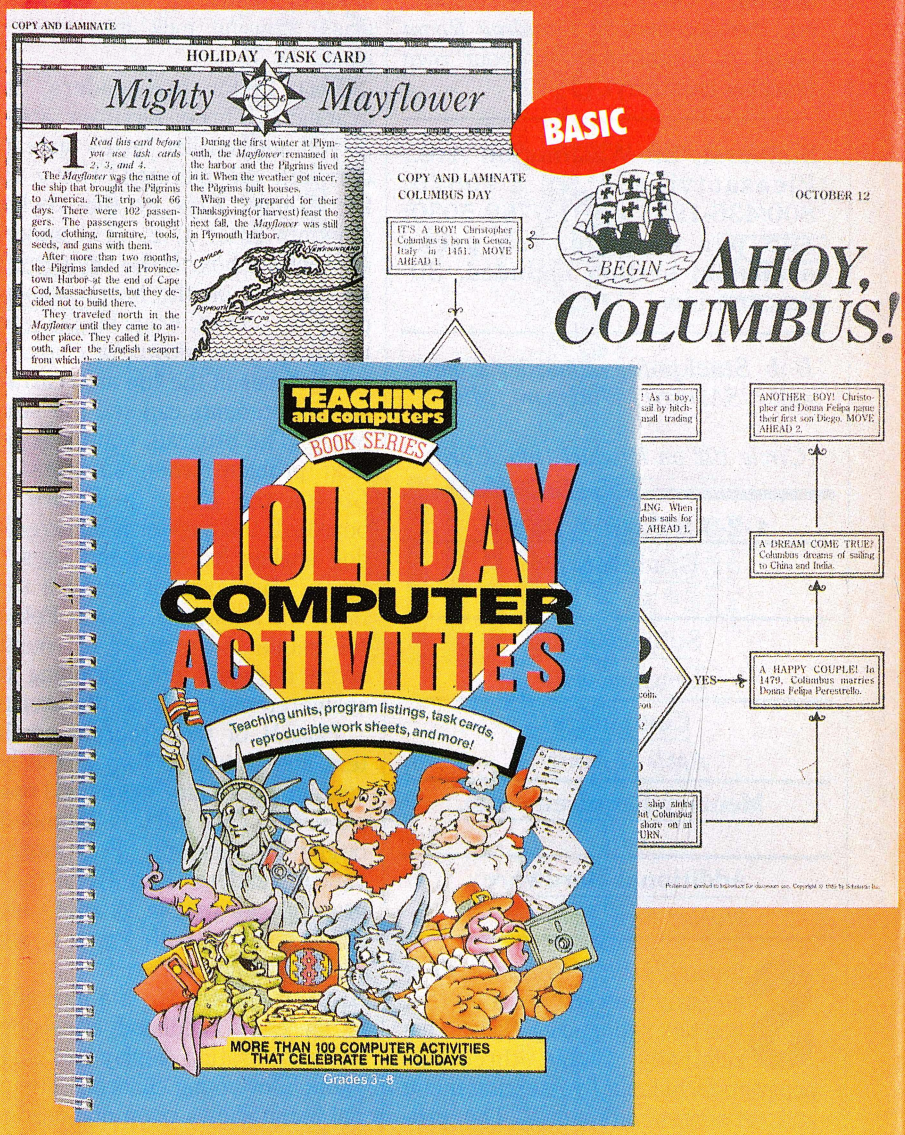

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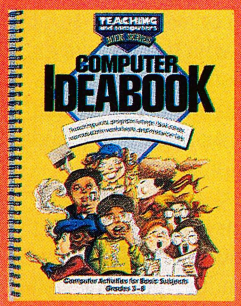

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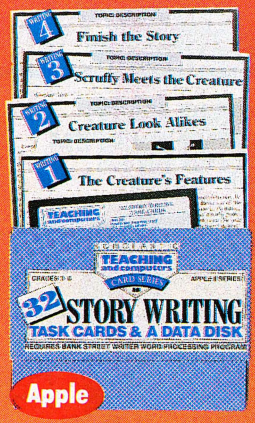

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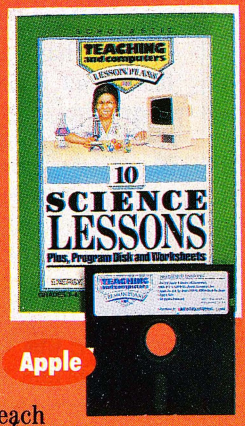

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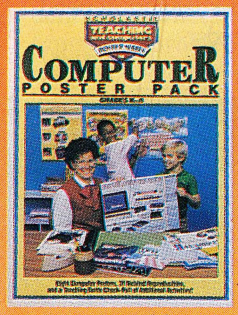

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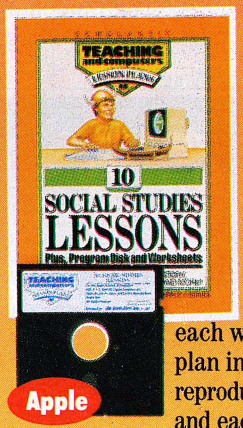

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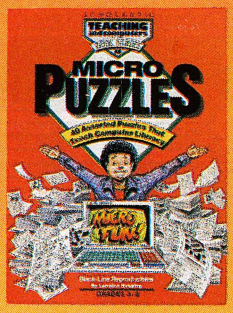

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accompany each section of the program.

There are several weaknesses which I would like to note. The program runs fairly slowly, and despite the fact that it asks the child to enter his or her name, it does not have a record-keeping component. Lastly, I thought some of the vocabulary used was a little difficult for beginning readers. For example: *cocoon, pumpkin,* and *pouring.*

In summary, I really liked *1-2-3 Sequence Me.* As a long-time primary teacher, I would have used a program like this quite often to work on this important skill.

Sunburst, 39 Washington Ave., Pleasantville, NY 10570, 800/431-1934 or 914/769-5030; $65 per package, lab packs available; backup included, 30-day preview.

Evelyn J. Woldman, *Educational Consultant, Adjunct Faculty/Lesley College, Framingham, MA.*

(Circle 103 on Product Info. Card)

MASTERING MATH MANAGEMENT SYSTEM

Grade Level:
1 - 5

Subject Area:
Math

Computer:
Apple II family

Memory Requirements:
128K

Mastering Math Management System from MECC cannot be beat for drilling students in the basic mathematics skills. The series consists of a sequenced collection of 38 drill and practice lessons which covers all four math operations for first through fifth grade. The series consists of a total of ten disks, seven which the children use as specific lessons. In addition, there are three utility disks which provide diagnostic, management, and worksheet-generation capabilities.

Part of the series, *Early Addition,* is a classic example of excellent MECC programming. The first lesson shows a birthday present, all wrapped up neatly with a bow. As the child solves the first few problems, the present is gradually unwrapped until the surprise inside is discovered.

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Circle 30 on Product Info Card.

The management disk is truly amazing. It offers teachers a plethora of options and allows teachers to prescribe any one of the 38 lessons according to class, group, or individual child. Children are monitored by the computer each day, automatically scoring the student's progress, telling the teacher which students are lagging behind, and stopping students from going on when they continue to make errors. Printed results and notices are also available. Teachers also have the option of having each child run through the diagnostic test disk, after which the computer will place the child at the appropriate level (although personally, I like to do the diagnosis myself, as I found the program's diagnostic process fairly time-consuming).

In addition, the Worksheet Generator allows you to customize worksheets for a class or individual students. Teachers can specify exact types of problems, whether they should be sequenced or arranged randomly on the page, and the program even prints the child's name on the sheet. This is an especially nice feature for Special Education teachers who may have to devise individualized worksheets for several different children within the classroom each day.

Sound, graphics, and review times can all be regulated by the teacher. As many as ten groups with a maximum of 144 students can be registered. The manuals all include specific lesson objectives, actual lesson plans, and follow-up activities. You can surely tell that these programs were laid out by teachers who were experienced in the field and were trying to make the daily work load of other professionals easier and more efficient.

The amount of flexibility which *Mastering Math Management System* allows teachers is really satisfying if you remember those early pieces of software which dictated to you and your students what was going to happen next or threw out math facts and problems in a totally random fashion. Does the software work through a given task in a systematic fashion so that the skill is thoroughly learned?

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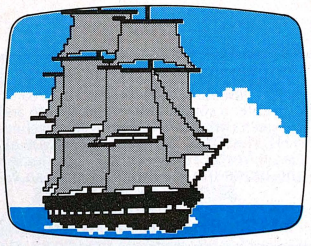

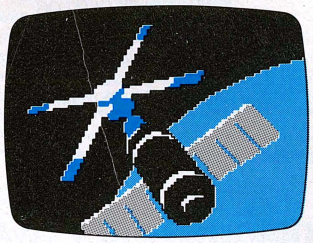

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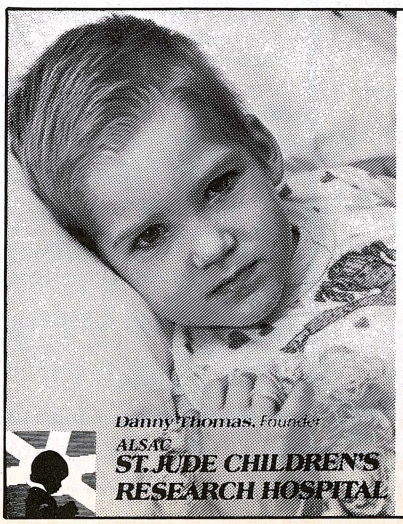

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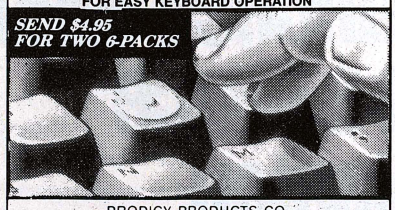

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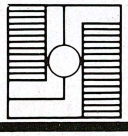

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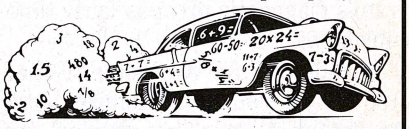

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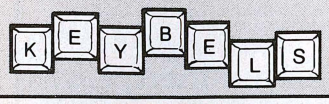

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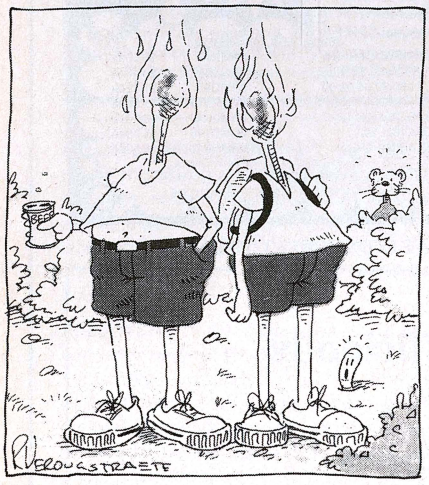

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***Syd Fletcher,** Principal, Wyoming Public School, Wyoming, Ontario, CANADA.*

(Circle 105 on Product Info. Card)

CACTUS FACTORY

Grade Level:
3 - 8

Subject Areas:
Math, Language Arts, Science, Social Studies, Art, Economics

Computers:
Apple II family

Memory Requirements:
64K

The challenge, should you choose to accept it, is to grow and sell 20 cacti in as few days as possible. In *Cactus Factory*, from Exsym, players are given $20 with which they must buy seeds and pots. Then they attempt to find the combination of cactus and pot that sells best. Since this combination changes from game to game, students can play again and again, each time developing a plan for reaching their goal as quickly as possible.

An extremely versatile program, *Cactus Factory* is visually exciting, easy to use, and will enhance many areas of the curriculum in grades three through eight. Each "turn" on the computer represents one day at one factory. When the player sells 20 cacti, the factory is entered in the *Hall of Fame.* Up to 40 different factories/games may be stored on the disk at one time, thus allowing *Cactus Factory* to be used with many different groupings of students, from whole classes to individuals. The screen displaying the *Hall of Fame* always announces the current record holder.

The program is so well-designed that users can boot it up and easily complete a game by following the directions on the screen, without reading the documentation. However, the documentation and "The Cactus Curriculum" support materials are excellent. The "Cactus Curriculum" makes it possible to use *Cactus Factory* as the base for an entire thematic unit, integrating math, science, art, social studies, and language arts. Activities are also suggested for word processing, programming, and data bases within each curricular area. For example, the "Introduction to Economics" section includes activities to introduce economic decision-making and thoroughly explore the concepts of supply and demand and factors of production. The program also contains correlations with economics curricula.

Simulations provide ever-changing environments in which students can explore different realities. Who knows, perhaps *Cactus Factory* users today, are the enterpreneurs of tomorrow?

Exsym, 301 North Harrison Street, Bldg. B, Suite 435, Princeton, NJ 08540, $39.95; backup included, 15-day preview.

***Candy Colborn,** Media Specialist, Cottonwood Creek Elementary, Denver, CO.* ■

(Circle 104 on Product Info. Card)

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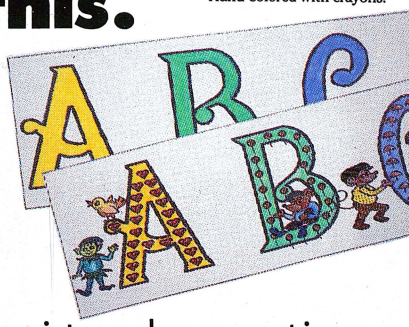

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